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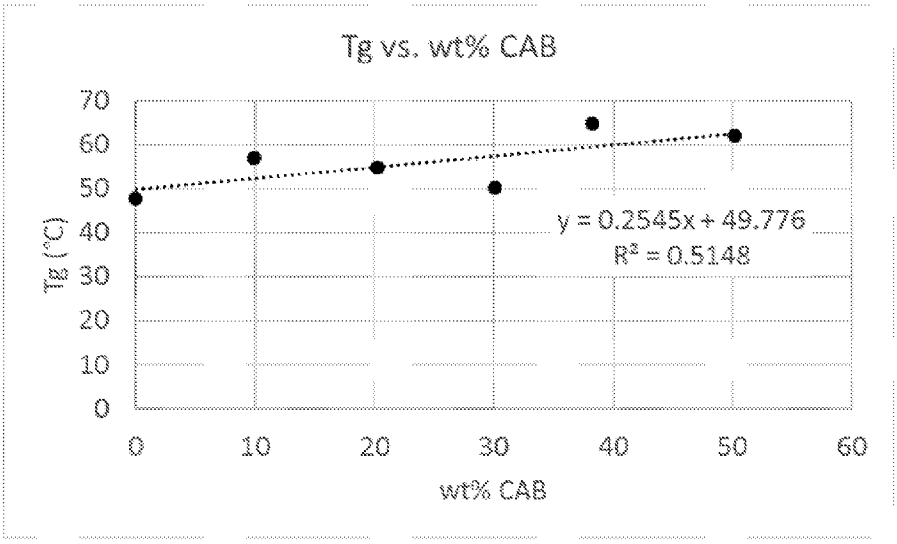
(54) Title: COMPOSITIONS AND KITS FOR FORMING RIGID LENS COMPONENTS COMPRISING A DERIVATIVE OF CELLULOSE

Figures

Fig. 1



(57) Abstract: Disclosed herein are compositions and kits of materials for forming a component of a rigid lens. An exemplary composition comprises an isocyanate terminated and/or hydroxyl terminated pre-polymer; a polyol that is a monomeric polyol, or a propoxylate thereof, and/or a di-, tri-, or tetra- isocyanate functional monomer; and from 5 to 55 wt%, based on the total weight of the composition, of a derivative of cellulose. An exemplary kit of materials comprises a first component comprising one or more isocyanate-functional components and a second component comprising one or more hydroxyl-functional components. The compositions or kits may be useful in forming rigid lens components, particularly in rigid lenses comprising electronic components.

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COMPOSITIONS AND KITS FOR FORMING RIGID LENS COMPONENTS COMPRISING A DERIVATIVE OF CELLULOSE

Cross-Reference to Related Applications

This application is an international application claiming priority to US Provisional Application 62/567298, filed 3 October 2017, the entire contents of which is hereby incorporated by reference in its entirety.

Field

The disclosed inventions pertain to compositions and kits of materials that may be useful for forming rigid lens components, methods that may be used to form rigid lens components, and rigid lens components formed therefrom.

Background

Contact lenses are typically made from silicone hydrogel materials. Silicone hydrogel contact lenses seek an optimal balance of numerous properties to achieve optimal properties and patient comfort. Examples of these properties include oxygen permeability, wettability, lubricity, biocompatibility, physical strength, low modulus, and transparency. A low modulus is important because lower modulus lenses are more likely to conform to eye curvature, thereby resulting in improved user comfort.

Although silicone hydrogels achieve excellent optical clarity and oxygen permeability, their hardness and modulus are generally too low for certain biomedical applications, such as applications involving sensors. Other candidate materials, such as silicone or fluorinated acrylates, suffer from high shrinkage and/or high post-processing costs related to mechanical finishing of the rigid material. Furthermore, existing rigid lens components have good hardness and oxygen permeability, but lack processing characteristics desirable for use in certain biomedical applications.

To overcome these disadvantages, polyurethanes have been considered. Polyurethanes offer the advantages of easy handling, moldability, optical clarity, and high biocompatibility.

Polyurethane hydrogels are known to be useful in contact lenses. US2002/0032297 discloses a prepolymer prepared by reacting a mixture containing a) at least one multi-functional compound, b) at least one diisocyanate, and c) at least one diol. When reacted with water, the pre-polymer forms a hydrogel polymer which may be reaction molded to form a contact lens.

WO2004/020495 discloses a method of producing thermoplastic hydrogels for use in contact lenses comprising the step of reaction one or more of a polyethylene oxide, a polyol,

and/or a polyamine with a poly isocyanate and a polyfunctional amine or polyalcohol. Preferably, the polyol is polyethylene glycol. The thermoplastic hydrogels exhibit a high level of swelling after molding and swelling with water.

A further attempt at forming lenses from polyurethane polymers is disclosed in WO2016/005733. This document discloses a poly(ethylene glycol) (PEG) compound, a PEG-PDMS-PEG copolymer diol and/or a block copolymer of ethylene oxide and propylene oxide, a poly isocyanate compound, a polyfunctional compound having an average functionality greater than 2, and a chain extender such as di-propylene glycol.

Despite these documents, there is still a need for polyurethanes that are useful in forming rigid lens components and that are able to achieve a desired combination of optical clarity, biocompatibility, hardness, and/or modulus.

Summary

Although past attempts at polyurethane compositions useful as rigid lens components may achieve benefits in oxygen permeability, strength, and transparency, the hardness, modulus, refractive index, and processing characteristics may be insufficient for certain biomedical applications, particularly those applications involving sensors.

In an embodiment, a composition for forming a component of a rigid lens comprises an isocyanate terminated and/or hydroxyl terminated pre-polymer; a polyol that is a monomeric polyol, or a propoxylate thereof, and/or a di-, tri-, or tetra- isocyanate functional monomer; and from 5 to 55 wt%, based on the total weight of the composition, of a derivative of cellulose. In an embodiment, the components of the composition are present as a kit of materials comprising a first component comprising one or more isocyanate-functional components and a second component comprising one or more hydroxyl-functional components. The compositions or kits may be useful in forming rigid lens components, particularly in rigid lens comprising electronic components.

Rigid lens components formed from the disclosed compositions and kits may have benefits in transparency, refractive index, oxygen permeability, strength, hardness, glass transition temperature, modulus, and processing characteristics.

Brief Description of the Drawings

Fig. 1 is a graph of Tg vs. wt% CAB associated with Example 2.

Fig. 2 is a graph of Ri vs. wt% CAB associated with Example 2.

Detailed Description

In accordance with an embodiment, a composition for forming a component of a rigid lens component comprises an isocyanate terminated and/or hydroxyl terminated pre-polymer; a

polyol that is a monomeric polyol, or a propoxylate thereof, and/or a di-, tri-, or tetra- isocyanate functional monomer; and from 5 to 55 wt%, based on the total weight of the composition, of a derivative of cellulose.

In an embodiment, the number of isocyanate groups of the isocyanate terminated pre-polymer and/or the di-, tri-, or tetra- functional isocyanate monomer, and/or the number of hydroxyl groups on the hydroxyl terminated pre-polymer and/or the polyol are chosen to provide the appropriate cross-linking. For instance, in an embodiment, the total of the average number of isocyanate/hydroxyl groups on the pre-polymer plus average number of isocyanate/hydroxyl groups on the di-, tri-, or tetra- functional isocyanate monomer or polyol, as applicable is equal to from 4.5 to 5.5. In an embodiment, the total is at least 4.5, at least 4.6, at least 4.7, at least 4.8, or at least 4.9. In an embodiment, the total is at most 5.5, at most 5.4, at most 5.3, at most 5.2, or at most 5.1. In an embodiment, the total is about 5. The notation "isocyanate/hydroxyl" is intended to mean isocyanate or hydroxyl, as applicable, based on whether the composition comprises an isocyanate terminated pre-polymer, a hydroxyl terminated pre-polymer, a polyol, and/or a di-, tri-, or tetra- isocyanate functional monomer.

In accordance with an embodiment, a composition for forming a component of a rigid lens component comprises a pre-polymer. A pre-polymer is a component containing a reactive functionality that can react with at least one other component of the composition or kit, and a subunit that repeats at least once. The pre-polymer is formed by reacting monomers and/or polymers separately from the other elements of the composition or kit under appropriate conditions.

In an embodiment, the pre-polymer is isocyanate terminated. An isocyanate terminated pre-polymer may be formed from a surplus of diisocyanate substituents, such as diisocyanate monomers or polymers, relative to the other substituents of the pre-polymer. Alternatively, an isocyanate terminated pre-polymer may be formed by reacting a diisocyanate with an OH-functional polymer, such as a hydrophobic poly(alkylene oxide) diol or a polymeric siloxane diol. For example, polypropylene glycol can be reacted with excess diisocyanate monomers to form an isocyanate terminated pre-polymer.

In an embodiment, the pre-polymer is hydroxyl terminated. A hydroxyl terminated pre-polymer may be formed from a surplus of hydroxyl substituents, such as diol monomers or polymers, relative to the other substituents of the pre-polymer. Alternatively, an hydroxyl terminated pre-polymer may be formed by reacting an excess of a diol, such as a hydrophobic poly(alkylene oxide) diol or a polymeric siloxane diol, with a isocyanate-functional polymer.

The pre-polymer comprises one or more isocyanate/hydroxyl groups per molecule, depending on whether it is an isocyanate terminated pre-polymer or a hydroxyl terminated pre-polymer. In an embodiment, the pre-polymer comprises an average of at least 1.7 isocyanate/hydroxyl groups per molecule, at least 1.8 isocyanate/hydroxyl groups per molecule,

at least 1.9 isocyanate/hydroxyl groups per molecule, 2 isocyanate/hydroxyl groups per molecule, an average of at least 2.1 isocyanate/hydroxyl groups per molecule, an average of at least 2.2 isocyanate/hydroxyl groups per molecule, or an average of at least 2.5 isocyanate/hydroxyl groups per molecule. In an embodiment, the pre-polymer comprises an average of at most 3 isocyanate/hydroxyl groups per molecule, an average of at most 2.7 isocyanate/hydroxyl groups per molecule, an average of at most 2.5 isocyanate/hydroxyl groups per molecule, an average of at most 2.4 isocyanate/hydroxyl groups per molecule, an average of at most 2.3 isocyanate/hydroxyl groups per molecule, an average of at most 2.2 isocyanate/hydroxyl groups per molecule, or an average of at most 2.1 isocyanate/hydroxyl groups per molecule. In embodiment, the pre-polymer comprises an average of from 1.8 to 2 isocyanate/hydroxyl groups per molecule.

The pre-polymer comprises the residue of an aliphatic diisocyanate, and i) the residue of a polymeric aliphatic diol and/or ii) the residue of a chain extender. In an embodiment, the pre-polymer is a polyurethane. In an embodiment, the pre-polymer is linear. Typically, the pre-polymer is linear if it comprises the reaction product of only components having two functional groups, for instance, when the pre-polymer consists of the reaction product of an aliphatic diisocyanate and a diol. In an embodiment, the pre-polymer is branched. Branching can be achieved by, for instance, incorporating a component having three or more functional groups, such as a triol or tetraol or triisocyanate or tetraisocyanate, into the composition from which the pre-polymer is formed.

By a reaction product it is meant that the component is engaged in a simultaneous or sequential chemical reaction. For example, a reaction product of a diisocyanate, a polymeric aliphatic diol, and a chain extender is formed i) when the diisocyanate, polymeric aliphatic diol, and chain extender are all reacted together in a single solution, or ii) when a pre-polymer is first formed by reacting the diisocyanate and the polymeric aliphatic diol, and then this prepolymer is subsequently reacted with the chain extender.

In an embodiment, the pre-polymer has a number average molecule weight (Mn) of at least 250 g/mol, at least 500 g/mol, at least 750 g/mol, at least 1000 g/mol, at least 1250 g/mol, or at least 1500 g/mol. In an embodiment, the pre-polymer has a Mn of at most 10000 g/mol, at most 7500 g/mol, at most 5000 g/mol, at most 4000 g/mol, at most 3000 g/mol, at most 2000 g/mol, or at most 1500 g/mol.

The pre-polymer comprises the residue of an aliphatic diisocyanate. In an embodiment, the aliphatic diisocyanate comprises hexamethylene diisocyanate (HDI), hydrogenated methylene diphenyl diisocyanate (HMDI), or isophorone diisocyanate (IPDI). In an embodiment, the aliphatic diisocyanate consists of one or more of hexamethylene diisocyanate (HDI), hydrogenated methylene diphenyl diisocyanate (HMDI), or isophorone diisocyanate (IPDI).

In an embodiment, the pre-polymer comprises the residue of a polymeric aliphatic diol. In an embodiment, the polymeric aliphatic diol comprises a polysiloxane diol, a hydrophobic poly(alkylene oxide) diol, or a copolymer diol of polysiloxane and hydrophobic poly(alkylene oxide). In an embodiment, the polymeric aliphatic diol consists of a polysiloxane diol, a hydrophobic poly(alkylene oxide) diol, a copolymer diol of polysiloxane and hydrophobic poly(alkylene oxide), or a mixture thereof.

In an embodiment, the pre-polymer comprises a block comprising polysiloxane and a block comprising hydrophobic poly(alkylene oxide). Such blocks may be formed by separate components, such as a polysiloxane diol and a hydrophobic poly(alkylene oxide) diol, or a single component, such as a copolymer diol of polysiloxane and hydrophobic poly(alkylene oxide). In an embodiment, at least 20 wt%, at least 30 wt%, at least 40 wt%, at least 50 wt%, at least 60 wt%, at least 70 wt%, at least 75 wt%, at wt 80 mol%, at wt 85 mol%, or at wt 90 mol% of the blocks in the pre-polymer are blocks comprising polysiloxane or blocks comprising hydrophobic poly(alkylene oxide).

In an embodiment, the pre-polymer comprises less than 5 wt% of hydrophilic polymer or is devoid of hydrophilic polymer. In an embodiment, the pre-polymer comprises less than 5 wt% of hydrophilic poly(alkylene oxide) or is devoid of hydrophilic poly(alkylene oxide).

In an embodiment, the polymeric aliphatic diol has a number average molecule weight (Mn) of at least 100 g/mol, at least 150 g/mol, at least 200 g/mol, at least 250 g/mol, at least 300 g/mol, at least 350 g/mol, or at least 400 g/mol. In an embodiment, the polymeric aliphatic diol has a Mn of at most 3000 g/mol, at most 2000 g/mol, at most at most 1000 g/mol, at most 900 g/mol, at most 800 g/mol, at most 700 g/mol, at most 600 g/mol, at most 500 g/mol, at most 400 g/mol, at most 300 g/mol, at most 200 g/mol, or at most 150 g/mol.

In an embodiment, at least 20 mol%, at least 30 mol%, at least 40 mol%, at least 50 mol%, at least 60 mol%, at least 70 mol%, at least 75 mol%, at least 80 mol%, at least 85 mol%, at least 90 mol%, at least 95 mol%, at least 98 mol%, or 100 mol% of the pre-polymer comprises the reaction product of i) an aliphatic diisocyanate and ii) a siloxane diol or a hydrophobic poly(alkylene oxide) diol. In an embodiment, at least 20 mol%, at least 30 mol%, at least 40 mol%, at least 50 mol%, at least 60 mol%, at least 70 mol%, at least 75 mol%, at least 80 mol%, at least 85 mol%, at least 90 mol%, at least 95 mol%, at least 98 mol%, or 100 mol% of the pre-polymer comprises the reaction product of an aliphatic diisocyanate and a polysiloxane diol. In an embodiment, at least 20 mol%, at least 30 mol%, at least 40 mol%, at least 50 mol%, at least 60 mol%, at least 70 mol%, at least 75 mol%, at least 80 mol%, at least 85 mol%, at least 90 mol%, at least 95 mol%, at least 98 mol%, or 100 mol% of the pre-polymer comprises the reaction product of an aliphatic diisocyanate and a hydrophobic poly(alkylene oxide) diol.

In an embodiment, the pre-polymer comprises the residue of a polysiloxane diol. In embodiment, the polysiloxane diol comprises a poly(dimethylsiloxane) diol. In an embodiment, the poly(dimethylsiloxane) diol comprises a hydroxy terminated poly(dimethylsiloxane) or hydroxylalkyl terminated poly(dimethylsiloxane). In an embodiment, the pre-polymer comprises a block of polysiloxane having a Mn of at least 500 g/mol, at least 750 g/mol, at least 1000 g/mol, at least 1200 g/mol, or at least 1500 g/mol. In an embodiment, the pre-polymer comprises a block of polysiloxane having a Mn of at most 10,000 g/mol, at most 7,500 g/mol, at most 5,000 g/mol, at most 3,000 g/mol, or at most 2,000 g/mol.

In an embodiment, the pre-polymer comprises a block comprising a hydrophobic poly(alkylene oxide). A hydrophobic poly(alkylene oxide) is a poly(alkylene oxide) that tends to repel and not absorb water, or to not be dissolvable in water. Poly(ethylene oxide) is not a hydrophobic poly(alkylene oxide). In an embodiment, the block comprising hydrophobic poly(alkylene oxide) comprises poly(propylene oxide), poly(tetramethylene oxide), a copolymer of poly(propylene oxide) and poly(tetramethylene oxide), or a mixture thereof. In an embodiment, the block comprising hydrophobic poly(alkylene oxide) consists of poly(propylene oxide), poly(tetramethylene oxide), a copolymer of poly(propylene oxide) and poly(tetramethylene oxide), or a mixture thereof. These blocks can be formed by incorporating the desired component as blocks of the polymeric aliphatic diol. In an embodiment, the polymeric aliphatic diol consists of a poly(propylene oxide) diol , a poly(tetramethylene oxide) diol, or a copolymer diol of poly(propylene oxide) and poly(tetramethylene oxide), or a mixture thereof.

In an embodiment, the polymeric aliphatic diol comprises a hydrophobic poly(alkylene oxide) diol having a number average molecule weight (Mn) of at least 150 g/mol, at least 200 g/mol, at least 250 g/mol, at least 300 g/mol, at least 350 g/mol, or at least 400 g/mol. In an embodiment, the polymeric aliphatic diol comprises a hydrophobic poly(alkylene oxide) diol having a Mn of at most 1500 g/mol, at most 1200 g/mol, at most 1000 g/mol, at most 900 g/mol, at most 800 g/mol, at most 700 g/mol, at most 600 g/mol, at most 500 g/mol, or at most 450 g/mol.

In an embodiment, the polymeric aliphatic diol comprises a hydrophobic poly(alkylene oxide) diol and at least 50 mol%, at least 60 mol%, at least 70 mol%, at least 80 mol%, at least 90 mol%, or at least 100 mol% of the hydrophobic poly(alkylene oxide) diol backbone is propylene oxide and/or tetramethylene oxide. In an embodiment, at least 50 mol%, at least 60 mol%, at least 70 mol%, at least 80 mol%, at least 90 mol%, or 100 mol% of blocks in the pre-polymer that comprise hydrophobic poly(alkylene oxide) comprises propylene oxide and/or tetramethylene oxide.

In an embodiment, the pre-polymer comprises the residue of a chain extender as defined below.

In an embodiment, the pre-polymer comprises the residue of a monomeric siloxane diol that has a molecular weight of at least 200 g/mol or at least 300 g/mol. In an embodiment, the pre-polymer comprises the residue of a monomeric siloxane diol that has a molecular weight of at most 600 g/mol or at most 500 g/mol. In an embodiment, the pre-polymer comprises the residue of 1,3-bis(hydroxypropyl)tetramethyldisiloxane, 1,3-bis(3-hydroxyisobutyl)tetramethyldisiloxane, 1,3-bis(4-hydroxybutyl)tetramethyldisiloxane, or 1,3-bis(3-(2-hydroxyethoxy)propyl)tetramethyldisiloxane.

The pre-polymer may contain the residue of other diols beyond the polymeric aliphatic diol or the chain extender. In an embodiment, the pre-polymer comprises a monomeric siloxane diol, a fluoroalkyl diol, or a fluoroalkyl ether diol.

In an embodiment, the pre-polymer comprises a monomeric siloxane diol.

In an embodiment, the pre-polymer comprises a block comprising fluoroalkyl or fluoroalkyl ether or comprises the residue of a fluorinated diol. In an embodiment, the pre-polymer comprises the residue of a fluoroalkyl or fluoroalkyl ether diol. The a fluoroalkyl or fluoroalkyl ether diol may be monomeric or polymeric. In an embodiment, the pre-polymer comprises the residue of 1H,1H,4H,4H-Perfluoro-1,4-butanediol, 1H,1H,5H,5H-Perfluoro-1,5-pentanediol, 1H,1H,6H,6H-perfluoro-1,6-hexanediol, 1H,1H,8H,8H-Perfluoro-1,8-octanediol, 1H,1H,9H,9H-Perfluoro-1,9-nonanediol, 1H,1H,10H,10H-Perfluoro-1,10-decanediol, 1H,1H,12H,12H-Perfluoro-1,12-dodecanediol, 1H,1H,8H,8H-Perfluoro-3,6-dioxaoctan-1,8-diol, 1H,1H,11H,11H-Perfluoro-3,6,9-trioxaundecan-1,11-diol. fluorinated triethylene glycol, or fluorinated tetraethylene glycol.

In an embodiment, the pre-polymer comprises the reaction product of at least 10 wt%, at least 15 wt%, or at least 20 wt% of an aliphatic diisocyanate; and at least 20 wt%, at least 30 wt%, at least 40 wt%, at least 50 wt%, at least 60 wt%, or at least 70 wt% of polymeric aliphatic diols that comprise a block comprising polysiloxane and/or a block comprising hydrophobic poly(alkylene oxide). In an embodiment, the pre-polymer comprises the reaction product of at most 50 wt%, at most 40 wt%, or at most 30 wt% of an aliphatic diisocyanate; and at most 90 wt%, at most 80 wt%, at most 70 wt%, or at most 60 wt%, of polymeric aliphatic diols that comprise a block comprising polysiloxane and/or a block comprising hydrophobic poly(alkylene oxide).

In an embodiment, the composition or kit further comprises at least 10 wt%, at least 20 wt%, at least 30 wt%, or at least 40 wt% of the pre-polymer. In an embodiment, the composition or kit comprises at most 70 wt%, at most 60 wt%, at most 50 wt%, or at most 40 wt% of the pre-polymer.

In an embodiment, the composition or kit further comprises a free aliphatic diol. The aliphatic diol may be polymeric or monomeric. In an embodiment, the free aliphatic diol comprises a chain extender as defined below. In an embodiment, the free aliphatic diol

comprises a hydrophobic poly(alkylene oxide) diol. In an embodiment, the free aliphatic diol comprises a poly(propylene oxide) diol, poly(tetramethylene oxide) diol, or a diol that comprises a copolymer of poly(propylene oxide) and poly(tetramethylene oxide). In an embodiment, the free aliphatic diol is a hydrophobic poly(alkylene oxide) diol having a number average molecule weight (Mn) of at least 150 g/mol, at least 200 g/mol, at least 250 g/mol, at least 300 g/mol, at least 350 g/mol, or at least 400 g/mol. In an embodiment, the free aliphatic diol is a hydrophobic poly(alkylene oxide) diol having a Mn of at most 1500 g/mol, at most 1200 g/mol, at most 1000 g/mol, at most 900 g/mol, at most 800 g/mol, at most 700 g/mol, at most 600 g/mol, at most 500 g/mol, or at most 450 g/mol. In an embodiment, the free aliphatic diol is a hydrophobic poly(alkylene oxide) diol comprising a mixture of a hydrophobic poly(alkylene oxide) diol having a number average molecular weight of less than 500 g/mol and a free hydrophobic poly(alkylene oxide) diol having a number average molecular weight of greater than 600 g/mol.

In an embodiment, the free aliphatic diol comprises a siloxane diol. In an embodiment, the free aliphatic diol comprises a monomeric or polymeric siloxane diol. In an embodiment, the free aliphatic diol comprises a blend of monomeric and polymeric siloxane diols. In an embodiment, the free aliphatic diol consists of a monomeric siloxane diol. In an embodiment, the free aliphatic diol consists of a polymeric siloxane diol. In an embodiment, the free aliphatic diol consists of a blend of monomeric and polymeric siloxane diols. In an embodiment, the free aliphatic diol comprises a monomeric siloxane diol that has a molecular weight of at least 200 g/mol or at least 300 g/mol. In an embodiment, the free aliphatic diol comprises a monomeric siloxane diol that has a molecular weight of at most 600 g/mol or at most 500 g/mol. In an embodiment, the free aliphatic diol comprises 1,3-bis(hydroxypropyl)tetramethyldisiloxane, 1,3-bis(3-hydroxyisobutyl)tetramethyldisiloxane, 1,3-bis(4-hydroxybutyl)tetramethyldisiloxane, or 1,3-bis(3-(2-hydroxyethoxy)propyl)tetramethyldisiloxane.

In an embodiment, the free aliphatic diol comprises a hydroxy terminated poly(dimethylsiloxane) or hydroxylalkyl terminated poly(dimethylsiloxane). In an embodiment, the free aliphatic diol comprises a polysiloxane diol having a Mn of at least 1000 g/mol, at least 1200 g/mol, or at least 1500 g/mol. In an embodiment, the free aliphatic diol comprises a polysiloxane diol having a Mn of at most 10,000 g/mol, at most 9,000 g/mol, at most 8,000 g/mol, at most 7,000 g/mol, at most 6,000 g/mol, or at most 5,000 g/mol.

In an embodiment, the free aliphatic diol comprises a fluorinated diol. In an embodiment, the free aliphatic diol comprises 1H,1H,4H,4H-Perfluoro-1,4-butanediol, 1H,1H,5H,5H-Perfluoro-1,5-pentanediol, 1H,1H,6H,6H-perfluoro-1,6-hexanediol, 1H,1H,8H,8H-Perfluoro-1,8-octanediol, 1H,1H,9H,9H-Perfluoro-1,9-nonanediol, 1H,1H,10H,10H-Perfluoro-1,10-decanediol, 1H,1H,12H,12H-Perfluoro-1,12-dodecanediol, 1H,1H,8H,8H-Perfluoro-3,6-dioxaoctan-1,8-diol, or 1H,1H,11H,11H-Perfluoro-3,6,9-trioxaundecan-1,11-diol. In an embodiment, the free

aliphatic diol consists of 1H,1H,4H,4H-Perfluoro-1,4-butanediol, 1H,1H,5H,5H-Perfluoro-1,5-pentanediol, 1H,1H,6H,6H-perfluoro-1,6-hexanediol, 1H,1H,8H,8H-Perfluoro-1,8-octanediol, 1H,1H,9H,9H-Perfluoro-1,9-nonanediol, 1H,1H,10H,10H-Perfluoro-1,10-decanediol, 1H,1H,12H,12H-Perfluoro-1,12-dodecanediol, 1H,1H,8H,8H-Perfluoro-3,6-dioxaoctan-1,8-diol, 1H,1H,11H,11H-Perfluoro-3,6,9-trioxaundecan-1,11-diol, or a blend thereof.

In an embodiment, the free aliphatic diol is present in an amount of at least 2 wt%, at least 5 wt%, or at least 10 wt%, based on the total weight of the composition or kit. In an embodiment, the free aliphatic diol is present in an amount of at most 40 wt%, at most 30 wt%, at most 20 wt%, or at most 10 wt%.

In an embodiment, the composition or kit further comprises a free aliphatic diisocyanate. In an embodiment, the free aliphatic diisocyanate is polymeric. In an embodiment, the free aliphatic diisocyanate is monomeric. In an embodiment, the free aliphatic diisocyanate comprises hexamethylene diisocyanate (HDI), hydrogenated methylene diphenyl diisocyanate (HMDI), or isophorone diisocyanate (IPDI). In an embodiment, the free aliphatic diisocyanate consists of one or more of hexamethylene diisocyanate (HDI), hydrogenated methylene diphenyl diisocyanate (HMDI), or isophorone diisocyanate (IPDI). In an embodiment, the free aliphatic diisocyanate is present in an amount of at least 2 wt%, at least 5 wt%, at least 10 wt%, at least 15 wt%, or at least 20 wt%, based on the total weight of the composition or kit. In an embodiment, the free aliphatic diisocyanate is present in an amount of at most 30 wt%, at most 20 wt%, at most 15 wt%, or at most 10 wt%, based on the total weight of the composition or kit.

In an embodiment, the composition or kit comprises a monomeric polyol or a propoxylate thereof. C_2-C_4 oxylated polyols are also monomeric polyols if they are oxylated an average of once or less per OH group, and not monomeric if they are oxylated an average of more than once per OH group. Therefore, glycerol propoxylate that is propoxylated once per OH group is both a monomeric polyol and a propoxylate of glycerol.

In embodiment, the polyol is a monomeric diol, triol, or tetraol, or a propoxylate thereof. In embodiment, the polyol is a monomeric triol or tetraol, or a propoxylate thereof. In an embodiment, the monomeric polyol comprises ethylene glycol, diethylene glycol, propylene glycol, dipropylene glycol, glycerol, glycerol propoxylate, glycerol ethoxylate, 1,2,4-benzenetriol, 3-methyl-1,3,5-pentanetriol, pentaerythritol, pentaerythritol propoxylate, or pentaerythritol ethoxylate. In an embodiment, the monomeric polyol consists of glycerol, pentaerythritol, or a mixture thereof. In an embodiment, the polyol consists of glycerol propoxylate, pentaerythritol propoxylate, or a mixture thereof. In an embodiment, the polyol has a molecular weight of from 90 to 500 g/mol. In an embodiment, the polyol has a molecular weight of from 90 to 280 g/mol. In an embodiment, the polyol is present in an amount of at least 1 wt%, at least 1.5 wt%, at least 2 wt%, or at least 2.5 wt%, based on the total weight of the composition or kit. In an

embodiment, the polyol is present in an amount of at most 12 wt%, at most 10 wt%, or at most 8 wt%, based on the total weight of the composition or kit.

In an embodiment, the composition comprises a di-, tri-, or tetra- isocyanate functional monomer. In an embodiment, the di-, tri-, or tetra- isocyanate functional monomer is a tri-, or tetra- isocyanate functional monomer. In an embodiment, the di-, tri-, or tetra- isocyanate functional monomer comprises methylidynetri-p-phenylene triisocyanate, undecane-1,6,11-triyl triisocyanate, or silicon tetraisocyanate. In an embodiment, the di-, tri-, or tetra- isocyanate functional monomer consists of methylidynetri-p-phenylene triisocyanate, undecane-1,6,11-triyl triisocyanate, silicon tetraisocyanate, or a mixture thereof. In an embodiment, the di-, tri-, or tetra- isocyanate functional monomer is present in an amount of at least 1 wt%, at least 1.5 wt%, at least 2 wt%, or at least 2.5 wt%, based on the total weight of the composition or kit. In an embodiment, the di-, tri-, or tetra- isocyanate functional monomer is present in an amount of at most 12 wt%, at most 10 wt%, or at most 8 wt%, based on the total weight of the composition or kit.

The composition or kit comprises from 5 to 55 wt%, based on the total weight of the composition or kit of derivative of cellulose. Generally, the derivative of cellulose is incorporated in the composition or kit by dissolving solid derivative of cellulose with liquid OH-functional components. In an embodiment, the derivative of cellulose comprises cellulose acetate butyrate, cellulose acetate propionate, ethyl cellulose, methyl cellulose, or cellulose acetate. In an embodiment, the derivative of cellulose consists of one or more of cellulose acetate butyrate, cellulose acetate propionate, ethyl cellulose, methyl cellulose, or cellulose acetate, or a mixture thereof.

In an embodiment, the derivative of cellulose is present in an amount of at least 10 wt%, at least 15 wt%, at least 20 wt%, at least 25 wt%, at least 30 wt%, or at least 35 wt%, based on the total weight of the composition or kit. In an embodiment, the derivative of cellulose is present in an amount of at most 50 wt%, at most 45 wt%, at most 40 wt%, at most 35 wt%, or at most 30 wt%, based on the total weight of the composition or kit.

In an embodiment, the derivative of cellulose is hydroxyl functional. In an embodiment, the derivative of cellulose comprises a hydroxyl content of at least 0.5 wt%, at least 1 wt%, at least 1.25 wt%, at least 1.5 wt%, at least 1.75 wt%, or at least 2 wt%, based on the total weight of the derivative of cellulose. In an embodiment, the derivative of cellulose comprises a hydroxyl content of at most 10 wt%, at most 7.5 wt%, at most 6 wt%, at most 5 wt%, at most 4 wt%, or at most 3 wt%, based on the total weight of the derivative of cellulose.

In an embodiment, the derivative of cellulose comprises cellulose comprising a butyryl substitution, for example, cellulose acetate butyrate. In an embodiment, the derivative of cellulose comprises a butyryl content of at least 10 wt%, at least 15 wt%, at least 20 wt%, at least 30 wt%, or at least 45 wt%, based on the total weight of the derivative of cellulose. In an

embodiment, the derivative of cellulose comprises a butyryl content of at most 60 wt%, at most 55 wt%, at most 45 wt%, or at most 40 wt%, based on the total weight of the derivative of cellulose.

In an embodiment, the derivative of cellulose comprises cellulose comprising a propionyl substitution, for example, cellulose acetate propionate. In an embodiment, the derivative of cellulose comprises a propionyl content of at least 15 wt%, of at least 20 wt%, at least 30 wt%, or at least 40 wt%, based on the total weight of the derivative of cellulose. In an embodiment, the derivative of cellulose comprises a propionyl content of at most 60 wt%, at most 55 wt%, at most 50 wt%, or at most 45 wt%, based on the total weight of the derivative of cellulose.

In an embodiment, the derivative of cellulose comprises cellulose comprising an acetyl substitution, for example, cellulose acetate, cellulose acetate butyrate, or cellulose acetate propionate. In an embodiment, the derivative of cellulose comprises cellulose comprising an acetyl substitution and a butyryl or propionyl substitution. In an embodiment, the derivative of cellulose comprises an acetyl content of at least 40 wt% and no other substitution. In an embodiment, the derivative of cellulose comprises an acetyl content of at least 0.5 wt%, at least 1 wt%, at least 2 wt%, at least 3 wt%, at least 5 wt%, or at least 10 wt% and a butyryl or propionyl substitution of at least 15 wt%, at least 20 wt%, or at least 25 wt%, of at least 30 wt%, based on the total weight of the derivative of cellulose. In an embodiment, the derivative of cellulose comprises an acetyl content of at most 30 wt%, at most 20 wt%, at most 15 wt%, at most 10 wt%, at most 5 wt%, or at most 3 wt%, based on the total weight of the derivative of cellulose.

In an embodiment, the derivative of cellulose has a Mn of at least 5000 g/mol, at least 10,000 g/mol, or at least 15,000 g/mol. In an embodiment, the derivative of cellulose has a Mn of at most 80,000 g/mol, at most 70,000 g/mol, at most 60,000 g/mol, or at most 50,000 g/mol.

In an embodiment, the composition or kit further comprises a chain extender. In an embodiment, the pre-polymer comprises the residue of a chain extender. A chain extender is an alkane diol having from 2 to 20 carbon atoms, wherein one or more carbon atoms may be substituted with oxygen. If in the composition or kit, the polyol that is a monomeric polyol, or a propoxylate thereof, comprises three OH groups or more, then a diol that satisfies the preceding definition of a chain extender is considered a chain extender rather than a polyol that is a monomeric polyol, or a propoxylate thereof. Conversely, if in the composition or kit, there is no polyol that is a monomeric polyol, or a propoxylate thereof that comprises three OH groups or more, then a diol that satisfies the preceding definition of a chain extender is considered to be a polyol that is a monomeric polyol, or a propoxylate thereof, rather than a chain extender.

In an embodiment, the chain extender has a molecular weight of at least 60 g/mol, at least 70 g/mol, at least 80 g/mol, at least 90 g/mol, or at least 100 g/mol. In an embodiment, the chain extender has a molecular weight of at most 500 g/mol, at most from 400 g/mol, at

most 300 g/mol, at most 200 g/mol, or at most 150 g/mol. In an embodiment, the chain extender comprises ethylene glycol, diethylene glycol, propylene glycol, dipropylene glycol, 1,3-propanediol, 1,4-butanediol, 1,5-pentanediol, 1,6-hexanediol, or 1,8-octanediol. In an embodiment, the chain extender is present in an amount of from 0 to 10 wt% of the composition or kit. In an embodiment, the chain extender is present in an amount of from 2 to 10 wt% of the composition or kit.

In an embodiment, the composition or kit comprises less than 10 wt% of hydrophilic polymer. The hydrophilic polymer may show up as free hydrophilic polymer in the solution, or may be part of the pre-polymer. In an embodiment, the composition or kit comprises less than 8 wt% of hydrophilic polymer or less than 5 wt% of hydrophilic polymer. In an embodiment, the composition or kit is devoid of hydrophilic polymer. Examples of hydrophilic polymers are poly(ethylene oxide), polyethylene glycol, polyvinylpyrrolidones, and poly(2-oxazolines). At least 51 mol% of the hydrophilic polymer comprises hydrophilic units. In an embodiment, the composition or kit comprises less than 10 wt% of poly(ethylene oxide). In an embodiment, the composition or kit comprises less than 8 wt% of poly(ethylene oxide)or less than 5 wt% of poly(ethylene oxide). In an embodiment, the composition or kit is devoid of poly(ethylene oxide).

In an embodiment, the composition or kit further comprises an isocyanate terminated pre-polymer or a hydroxy terminated pre-polymer.

The composition is typically curable at temperatures of from 23 °C to 100 °C. In an embodiment, the composition or kit further comprises a catalyst. In an embodiment, the catalyst is stannous octoate or dibutyltin dilaurate. Amine, mercury, zinc, or zirconium catalysts may also be used.

In an embodiment, a component is formed from the composition. The composition may be formed by combining the elements of the kit. In an embodiment, the component has a thickness of from 1 micrometer to 1 millimeter. The formed components may be flat components, may be shaped, such as in the shape of a ring, a concave surface suitable to fit on a surface of the eye, or a convex surface. Other molded shapes, included those with surface microstructures, may also be created.

The components are typically clear or water white upon curing. In an embodiment, a component formed from the composition has a refractive index of from 1.48 to 1.515, or from 1.48 to 1.5. In an embodiment, the component has a refractive index of from 1.48 to 1.495.

In an embodiment, a component formed from the composition, after exposure to 95% relative humidity for 24 hours at 23 °C, has a water content of 10 wt% or less. In an embodiment, a component formed from the composition has an elastic modulus of 500 MPa or greater. In an embodiment, a component formed from the composition has a Dk/t of from 1 to 100. In an embodiment, a component formed from the composition has a Shore D hardness of

from 60 to 80 or from 60 to 100. In an embodiment, the component has a Tg of from 40 to 100 °C.

Potential advantages of the composition are that it easily handled, has a long pot-life, has good moldability, is optically clear, and has good biocompatibility. Moreover, the high hardness and modulus may allow for mounting of electrical circuity, such as by patterning of conductive material or flip chip mounting. In an embodiment, an ocular device comprises a component formed from the composition and an electrical circuit mounted on the component.

In an embodiment, a component formed from the composition may be overmolded with a hydrogel, such as a silicone hydrogel, to yield an oxygen permeable ocular device. In an embodiment, an ocular device comprises a component formed from the composition, an electrical circuit mounted on the component, and a hydrogel material molded onto or around the component. In an embodiment, the component with an electrical circuit mounted thereon is encased in a waterproof layer, such as a wax or sealant, and then overmolded with a hydrogel or silicone hydrogel material.

The Examples below further elucidate embodiments of the invention, but of course, should not be construed as in any way limiting the scope of the claims.

Examples

The following test procedures are used in the Examples.

Glass Transition Temperature (T_g)

T_g is determined via differential scanning calorimetry (DSC). The measurements are performed using a TA Instruments Discovery Q200. Samples are cut from films. The samples are weighed and sealed in an aluminum pan. The sample is cooled from room temperature to -90 °C at a ramp rate of 10 °C/min. The sample is then heated to 250 °C at 10 °C/min followed again by cooling to -90 °C at 10 °C/min. The sample is then heated again (second heating run) to 250 °C at 10 °C/min. The T_g of the material is determined during this second heating run.

Hardness

A PTC Instruments Model #307L, ASTM Type D durometer is used. Film samples are placed on the Shore D Hardness stage opposite a 5 kg counter weight. The measurement is completed at least 10 times in different locations and the average taken.

Refractive Index

Film samples are cut to the width of the Abbe Refractometer testing surface, with the clear edge facing the light source. Cinnamon oil (refractive index = 1.53) is used as the contact

liquid. The measurement is completed at 25 °C. The measurement is taken at least three times and the average taken.

The components used in the Examples are shown in Table 0.1.

Table 0.1: Components used in the Examples

Ref	Component	CAS#	Manufacturer
CAB	Cellulose Acetate Butyrate	9004-36-8	Sigma Aldrich
1-methoxy-2-propanol	1-methoxy-2-propanol	107-98-2	Sigma Aldrich
PEG200	Poly(ethylene glycol) Mn ~200 g/mol	25322-68-3	Sigma Aldrich
PPG425	Poly(propylene glycol) Mn ~425 g/mol	25322-69-4	Sigma Aldrich
Glycerol PO	Poly-G® 76-635 - Glycerol Propoxylate	25791-96-2	Monument Chemical
HDI	hexamethylene diisocyanate	822-06-0	TCI America
IPDI	Isophorone diisocyanate	4098-71-9	TCI America
Pre-polymer	BAYTEC® WP-260 – isocyanate terminated pre-polymer based on PPG; %NCO 25.8-27.0	N/A	Covestro
EG	Ethylene Glycol	107-21-1	Sigma Aldrich
Catalyst	Stannous Octoate	301-10-0	Sigma Aldrich

The CAB has a Mn of approximately 12,000 g/mol, a hydroxyl content of about 1.5%, an acetyl content of less than or equal to about 4%, and a butyryl content of 50-54%.

Composition Preparation and Film Formation

All compositions are generated using the following procedure. The OH-functional components (PEG200, PPG425, Glycerol PO, 1-methoxy-2-propanol, EG, CAB) are placed in an empty polypropylene mixing cup. The catalyst is then added to this mixture. The mixture is mixed in a centrifugal mixer at 2000 RPM for 5 minutes. The mixture is then placed in an oven at 100 °C for 20-30 minutes. After heating, the appropriate amount of isocyanate functional component(s) (pre-polymer, HDI, IPDI) is added and the entire composition is placed into a centrifugal mixer. The mixture is mixed under vacuum at 2000 RPM and 20 kPa for 5 minutes in order to mix and degas the composition.

Example 1

Several compositions are formed according to the above procedures. Each composition is cast into a silicon mold (10.2 cm diameter, 2 cm deep) and placed in a convection oven set to 90 °C for 12 hours. The rigid film (thickness ~1.2 mm) is then removed from the oven, and the properties are analyzed according to the above described procedures. The formulas and measured properties are shown in Table 1, below. All component amounts are in wt%, based on the total weight of the composition.

Table 1 – Example 1 Compositions and Results

Ex.	Pre-polymer	HDI	IPDI	CAB	1-methoxy-2-propanol	Glycerol PO	EG	PEG200	PPG425	Refractive Index	Tg (°C)
1	59.69			6.75	31.80	1.76				1.491	23.05
2	54.32			7.78	36.67	1.23				1.493	30.23
3	41.64	12.62		7.73	36.44	1.58				1.497	13.47
4	48.33			17.04	30.93	3.70				1.494	25.37
5	28.74	20.02		13.27	18.14	19.83				1.490	9.13
6	55.33			13.63	10.14	20.90				1.499	63.87
7	40.71	11.72		14.34	10.21	23.02				1.498	51.51
8	40.26	12.19		15.33	7.54	24.68				1.496	70.78
9	35.02	10.89		19.23	3.37	31.49				1.502	57.16
10	44.28			10.44	7.52				37.76	1.491	5.74
11	45.03			9.91	1.75	8.07			35.24	1.498	89.39
12	64.60			14.36	2.67	9.49	8.89			1.506	30.18
13	46.80			8.73	5.99	7.29			31.19	1.500	28.95
14	57.52			11.66	2.71	2.30		25.81		1.504	41.71
15	60.09			11.00	7.00	1.94	3.31	16.66		1.508	59.62
16	36.18		16.33	10.38	4.02	4.49		28.60		1.501	61.18
17	37.50		20.38	12.25	5.00	2.32	4.07	18.48		1.505	34.81
18	45.08			9.67	3.25	8.41			33.58	1.499	27.49
19	39.39	3.86		9.86	2.63	7.88			36.38	1.492	20.18
20	33.17	8.09		10.49	3.03	8.74			36.49	1.493	13.94
21	25.58	12.79		10.17	5.04	8.87			37.56	1.487	3.86
22	17.45	18.32		11.45	2.09	9.68			41.01	1.489	-4.87
23	17.60	22.63		10.66	2.18	8.38			38.55	1.488	-0.22
24	46.05			9.33	2.42	7.93			34.27	1.496	32.86
25	44.88			10.25		8.16			36.72	1.494	27.55

Ex.	Pre-polymer	HDI	IPDI	CAB	1-methoxy-2-propanol	Glycerol PO	EG	PEG200	PPG425	Refractive Index	Tg (°C)
26	31.47	3.09		30.89		6.17			28.38	1.489	27.14
27	31.02	3.10		34.66		6.89			24.32	1.490	34.07
28	35.00	4.04		33.60		3.39	3.48		20.50	1.489	47.39
29	41.53			30.71		3.17	3.05		21.54	1.490	53.80
30	41.19	4.29		28.51		3.05	5.73		17.24	1.495	72.97
31	41.23	5.52		27.83		5.70	5.57		14.16	1.493	64.99
32	50.44			25.98		2.65	2.65		18.27	1.503	57.71

Example 2

Several compositions are formed according to the above procedures. Each composition comprises approximately the same ratio of the components other than CAB, while incrementally increasing the amount of CAB.

Each composition is cast into a silicon mold (10.2 cm diameter, 2 cm deep) and placed in a convection oven set to 90 °C for 12 hours. The rigid film (thickness ~1.2 mm) is then removed from the oven, and the properties are analyzed according to the above described procedures. The formulas and measured properties are shown in Table 1, below. All component amounts are in wt%, based on the total weight of the composition.

Table 2 – Example 2 Compositions and Results

Ex.	Pre-polymer	CAB	Glycerol PO	EG	PPG425	Refractive Index	Tg (°C)
2-1	59.17	0	4.41	5.57	30.85	1.5067	47.8
2-2	54.15	9.95	4.07	4.60	27.23	1.4983	57.0
2-3	47.25	20.21	3.71	4.02	24.81	1.4968	54.7
2-4	41.65	30.08	3.27	3.14	21.86	1.4922	50.2
2-5	38.81	38.3	2.69	2.20	17.99	1.4876	64.6
2-6	30.16	50.15	2.37	1.48	15.84	1.488	62.1

Fig. 1 is a graph of Tg (°C) vs. wt% CAB for Example 2. Fig. 2 is a graph of Ri vs. wt% CAB for Example 2. The graphs show a surprising improvement in the combination of Tg and refractive index.

Additional Description of Exemplary Embodiments

When an embodiment mentions a feature of "the pre-polymer" it is intended to describe a feature of either the isocyanate terminated pre-polymer or the hydroxyl terminated pre-polymer.

1. A composition for forming a component of a rigid lens comprising:
    a. from 45 to 95 wt%, based on the total weight of the composition, of a thermosetting component comprising:
        i. an isocyanate terminated pre-polymer having an average of more than one isocyanate group per molecule and comprising the residue of an aliphatic diisocyanate, and i) the residue of a polymeric aliphatic diol and/or ii) the residue of a chain extender,
        ii. a polyol that is a monomeric polyol, or a propoxylate thereof,
    b. a thermoplastic component comprising from 5 to 55 wt%, based on the total weight of the composition, of a derivative of cellulose;

wherein the isocyanate terminated pre-polymer has an average of more than two isocyanate groups per molecule or the polyol has an average of more than 2 hydroxyl groups per molecule.

2. A kit of materials that when combined form a composition for forming a component of a rigid lens, comprising:
    a. a first component comprising one or more isocyanate-functional components and devoid of hydroxyl-functional components, comprising:
        i. an isocyanate terminated pre-polymer having an average of more than one isocyanate group per molecule and comprising the residue of an aliphatic diisocyanate, and i) the residue of a polymeric aliphatic diol, and and/or ii) the residue of a chain extender,
    b. a second component comprising one or more hydroxyl-functional components and devoid of isocyanate-functional components, comprising:
        i. a polyol that is a monomeric polyol, or a propoxylate thereof,
        ii. from 5 to 55 wt%, based on the total weight of the composition, of a derivative of cellulose dissolved in the second component,

    wherein the isocyanate terminated pre-polymer has an average of more than two isocyanate groups per molecule or the polyol has an average of more than 2 hydroxyl groups per molecule.
3. The composition or kit according to any one of the two preceding exemplary embodiments, wherein the average number of isocyanate groups on the isocyanate terminated pre-polymer plus the average number of hydroxyl groups of the polyol is equal to at least 4.5, at least 4.6, at least 4.7, at least 4.8, or at least 4.9
4. The composition or kit according to any one of the three preceding exemplary embodiments, wherein the average number of isocyanate groups on the isocyanate terminated pre-polymer plus the average number of hydroxyl groups of the polyol is equal to at most 5.5, at most 5.4, at most 5.3, at most 5.2, or at most 5.1.
5. The composition or kit according to any one of the four preceding exemplary embodiments, wherein the average number of isocyanate groups on the isocyanate terminated pre-polymer plus the average number of hydroxyl groups of the polyol is about 5.
6. A composition for forming a component of a rigid lens comprising:
    a. from 45 to 95 wt%, based on the total weight of the composition, of a thermosetting component comprising:
        i. a hydroxyl terminated pre-polymer having an average of more than one hydroxyl group per molecule and comprising the residue of an aliphatic

diisocyanate, and i) the residue of a polymeric aliphatic diol and/or ii) the residue of a chain extender,

ii. a di-, tri-, or tetra- isocyanate functional monomer,

b. a thermoplastic component comprising from 5 to 55 wt%, based on the total weight of the composition, of a derivative of cellulose;

wherein the hydroxyl terminated pre-polymer has an average of more than two hydroxyl groups per molecule or the isocyanate functional monomer has an average of more than 2 isocyanate groups per molecule.

7. A kit of materials that when combined form a composition for forming a component of a rigid lens, comprising:

a. a first component comprising one or more isocyanate-functional components and devoid of hydroxyl-functional components, comprising:

i. a di-, tri-, or tetra- isocyanate functional monomer,

b. a second component comprising one or more hydroxyl-functional components and devoid of isocyanate-functional components, comprising:

i. a hydroxyl terminated pre-polymer having an average of more than one hydroxyl group per molecule and comprising the residue of an aliphatic diisocyanate, and i) the residue of a polymeric aliphatic diol and/or ii) the residue of a chain extender,

ii. from 5 to 55 wt%, based on the total weight of the composition, of a derivative of cellulose dissolved in the second component,

wherein the isocyanate functional monomer has an average of more than two isocyanate groups per molecule or the hydroxyl terminated pre-polymer has an average of more than 2 hydroxyl groups per molecule.

8. The composition or kit according to any one of the two preceding exemplary embodiments, wherein the average number of hydroxyl groups on the hydroxyl terminated pre-polymer plus the average number of isocyanate groups of the di-, tri-, or tetra- isocyanate functional monomer is equal to at least 4.5, at least 4.6, at least 4.7, at least 4.8, or at least 4.9

9. The composition or kit according to any one of the three preceding exemplary embodiments, wherein the average number of hydroxyl groups on the hydroxyl terminated pre-polymer plus the average number of isocyanate groups of the di-, tri-, or tetra- isocyanate functional monomer is equal to at most 5.5, at most 5.4, at most 5.3, at most 5.2, or at most 5.1.

10. The composition or kit according to any one of the four preceding exemplary embodiments, wherein the average number of hydroxyl groups on the hydroxyl

terminated pre-polymer plus the average number of isocyanate groups of the di-, tri-, or tetra- isocyanate functional monomer is about 5.

11. A composition for forming a component of a rigid lens comprising:
    a. from 45 to 95 wt%, based on the total weight of the composition, of a thermosetting component comprising
        i. a hydroxyl terminated pre-polymer having an average of more than one hydroxyl group per molecule and comprising the residue of an aliphatic diisocyanate, and i) the residue of a polymeric aliphatic diol and/or ii) the residue of a chain extender;
        ii. a polyol that is a monomeric polyol, or a propoxylate thereof,
        iii. a free aliphatic diisocyanate;
    b. a thermoplastic component comprising from 5 to 55 wt%, based on the total weight of the composition, of a derivative of cellulose;

    wherein the hydroxyl terminated pre-polymer has an average of more than two hydroxyl groups per molecule or the polyol has an average of more than 2 hydroxyl groups per molecule.
12. A kit of materials that when combined form a composition for forming a component of a rigid lens, comprising:
    a. a first component comprising one or more isocyanate-functional components and devoid of hydroxyl-functional components, comprising:
        i. a free aliphatic diisocyanate,
    b. a second component comprising one or more hydroxyl-functional components and devoid of isocyanate-functional components, comprising:
        i. a hydroxyl terminated pre-polymer having an average of more than one hydroxyl group per molecule and comprising the residue of an aliphatic diisocyanate, and i) the residue of a polymeric aliphatic diol and/or ii) the residue of a chain extender,
        ii. a polyol that is a monomeric polyol, or a propoxylate thereof,
        iii. from 5 to 55 wt%, based on the total weight of the composition, of a derivative of cellulose dissolved in the second component,

    wherein the hydroxyl terminated pre-polymer has an average of more than two hydroxyl groups per molecule or the polyol has an average of more than 2 hydroxyl groups per molecule.
13. The composition or kit according to any one of the two preceding exemplary embodiments, wherein the average number of hydroxyl groups on the hydroxyl terminated pre-polymer plus the average number of hydroxyl groups of the polyol is equal to at least 4.5, at least 4.6, at least 4.7, at least 4.8, or at least 4.9

14. The composition or kit according to any one of the three preceding exemplary embodiments, wherein the average number of hydroxyl groups on the hydroxyl terminated pre-polymer plus the average number of hydroxyl groups of the polyol is equal to at most 5.5, at most 5.4, at most 5.3, at most 5.2, or at most 5.1.

15. The composition or kit according to any one of the four preceding exemplary embodiments, wherein the average number of hydroxyl groups on the hydroxyl terminated pre-polymer plus the average number of hydroxyl groups of the polyol is about 5.

16. A composition for forming a component of a rigid lens comprising:

a. from 45 to 95 wt%, based on the total weight of the composition, of a thermosetting component comprising:
    i. an isocyanate terminated pre-polymer having an average of more than one isocyanate group per molecule and comprising the residue of an aliphatic diisocyanate, and i) the residue of a polymeric aliphatic diol and/or ii) the residue of a chain extender,
    ii. a di-, tri-, or tetra- isocyanate functional monomer,
    iii. a free aliphatic diol;
b. a thermoplastic component comprising from 5 to 55 wt%, based on the total weight of the composition, of a derivative of cellulose;

wherein the isocyanate terminated pre-polymer has an average of more than two isocyanate groups per molecule or the isocyanate functional monomer has an average of more than two isocyanate groups per molecule.

17. A kit of materials that when combined form a composition for forming a component of a rigid lens, comprising:

a. a first component comprising one or more isocyanate-functional components and devoid of hydroxyl-functional components, comprising:
    i. an isocyanate terminated pre-polymer having an average of more than one isocyanate group per molecule and comprising the residue of an aliphatic diisocyanate, and i) the residue of a polymeric aliphatic diol and/or ii) the residue of a chain extender,
    ii. a di-, tri-, or tetra- isocyanate functional monomer,
b. a second component comprising one or more hydroxyl-functional components and devoid of isocyanate-functional components, comprising:
    i. a free aliphatic diol,
    ii. from 5 to 55 wt%, based on the total weight of the composition, of a derivative of cellulose dissolved in the second component,

wherein the isocyanate terminated pre-polymer has an average of more than two isocyanate groups per molecule or the isocyanate functional monomer has an average of more than two isocyanate groups per molecule.

18. The composition or kit according to any one of the two preceding exemplary embodiments, wherein the average number of isocyanate groups on the isocyanate terminated pre-polymer plus the average number of isocyanate groups of the di-, tri-, or tetra- isocyanate functional monomer is equal to at least 4.5, at least 4.6, at least 4.7, at least 4.8, or at least 4.9
19. The composition or kit according to any one of the three preceding exemplary embodiments, wherein the average number of isocyanate groups on the isocyanate terminated pre-polymer plus the average number of isocyanate groups of the di-, tri-, or tetra- isocyanate functional monomer is equal to at most 5.5, at most 5.4, at most 5.3, at most 5.2, or at most 5.1.
20. The composition or kit according to any one of the four preceding exemplary embodiments, wherein the average number of isocyanate groups on the isocyanate terminated pre-polymer plus the average number of isocyanate groups of the di-, tri-, or tetra- isocyanate functional monomer is about 5.
21. The composition or kit according to any one of the preceding exemplary embodiments, wherein the isocyanate terminated pre-polymer comprises an average of at least 1.7 isocyanate groups per molecule, at least 1.8 isocyanate groups per molecule, at least 1.9 isocyanate groups per molecule, 2 isocyanate groups per molecule, an average of at least 2.1 isocyanate groups per molecule, an average of at least 2.2 isocyanate groups per molecule, or an average of at least 2.5 isocyanate groups per molecule.
22. The composition or kit according to any one of the preceding exemplary embodiments, wherein the isocyanate terminated pre-polymer comprises an average of at most 3 isocyanate groups per molecule, an average of at most 2.7 isocyanate groups per molecule, an average of at most 2.5 isocyanate groups per molecule, an average of at most 2.4 isocyanate groups per molecule, an average of at most 2.3 isocyanate groups per molecule, an average of at most 2.2 isocyanate groups per molecule, or an average of at most 2.1 isocyanate groups per molecule.
23. The composition or kit according to any one of the preceding exemplary embodiments, wherein the isocyanate terminated pre-polymer comprises an average of from 1.8 to 2 isocyanate groups per molecule.
24. The composition or kit according to any one of the preceding exemplary embodiments, wherein the isocyanate terminated pre-polymer comprises an average of from 2.5 to 3 isocyanate groups per molecule.

25. The composition or kit according to any one of the preceding exemplary embodiments, wherein the hydroxyl terminated pre-polymer comprises an average of at least 1.7 hydroxyl groups per molecule, at least 1.8 hydroxyl groups per molecule, at least 1.9 hydroxyl groups per molecule, 2 hydroxyl groups per molecule, an average of at least 2.1 hydroxyl groups per molecule, an average of at least 2.2 hydroxyl groups per molecule, or an average of at least 2.5 hydroxyl groups per molecule.
26. The composition or kit according to any one of the preceding exemplary embodiments, wherein the hydroxyl terminated pre-polymer comprises an average of at most 3 hydroxyl groups per molecule, an average of at most 2.7 hydroxyl groups per molecule, an average of at most 2.5 hydroxyl groups per molecule, an average of at most 2.4 hydroxyl groups per molecule, an average of at most 2.3 hydroxyl groups per molecule, an average of at most 2.2 hydroxyl groups per molecule, or an average of at most 2.1 hydroxyl groups per molecule.
27. The composition or kit according to any one of the preceding exemplary embodiments, wherein the hydroxyl terminated pre-polymer comprises an average of from 1.8 to 2 hydroxyl groups per molecule.
28. The composition or kit according to any one of the preceding exemplary embodiments, wherein the hydroxyl terminated pre-polymer comprises an average of from 2.5 to 3 hydroxyl groups per molecule.
29. The composition or kit according to any one of the preceding exemplary embodiments, wherein the pre-polymer is linear.
30. The composition or kit according to any one of the preceding exemplary embodiments, wherein the pre-polymer is branched.
31. The composition or kit according to any one of the four preceding exemplary embodiments, wherein the pre-polymer is a polyurethane.
32. The composition or kit according to any one of the preceding exemplary embodiments, wherein the pre-polymer has a number average molecule weight (Mn) of at least 250 g/mol, at least 500 g/mol, at least 750 g/mol, at least 1000 g/mol, at least 1250 g/mol, or at least 1500 g/mol.
33. The composition or kit according to any one of the preceding exemplary embodiments, wherein the pre-polymer has a Mn of at most 10000 g/mol, at most 7500 g/mol, at most 5000 g/mol, at most 4000 g/mol, at most 3000 g/mol, at most 2000 g/mol, or at most 1500 g/mol.
34. The composition or kit according to any one of the preceding exemplary embodiments, wherein the aliphatic diisocyanate comprises hexamethylene diisocyanate (HDI), hydrogenated methylene diphenyl diisocyanate (HMDI), or isophorone diisocyanate (IPDI).

35. The composition or kit according to any one of the preceding exemplary embodiments, wherein the aliphatic diisocyanate consists of hexamethylene diisocyanate (HDI), hydrogenated methylene diphenyl diisocyanate (HMDI), or isophorone diisocyanate (IPDI), or a mixture thereof.
36. The composition or kit according to any one of the preceding exemplary embodiments, wherein the polymeric aliphatic diol comprises a polysiloxane diol or a hydrophobic poly(alkylene oxide) diol.
37. The composition or kit according to any one of the preceding exemplary embodiments, wherein the polymeric aliphatic diol comprises a hydrophobic poly(alkylene oxide) diol.
38. The composition or kit according to any one of the preceding exemplary embodiments, wherein the polymeric aliphatic diol consists of a polysiloxane diol, a hydrophobic poly(alkylene oxide) diol, a copolymer diol of polysiloxane and hydrophobic poly(alkylene oxide), or a mixture thereof.
39. The composition or kit according to any one of the preceding exemplary embodiments, wherein the pre-polymer comprises less than 5 wt% of hydrophilic polymer or is devoid of hydrophilic polymer.
40. The composition or kit according to any one of the preceding exemplary embodiments, wherein the pre-polymer comprises less than 5 wt% of hydrophilic poly(alkylene oxide) or is devoid of hydrophilic poly(alkylene oxide).
41. The composition or kit according to any one of the preceding exemplary embodiments, wherein the polymeric aliphatic diol has a number average molecule weight (Mn) of at least 100 g/mol, at least 150 g/mol, at least 200 g/mol, at least 250 g/mol, at least 300 g/mol, at least 350 g/mol, or at least 400 g/mol.
42. The composition or kit according to any one of the preceding exemplary embodiments, wherein the polymeric aliphatic diol has a Mn of at most 3000 g/mol, at most 2000 g/mol, at most at most 1000 g/mol, at most 900 g/mol, at most 800 g/mol, at most 700 g/mol, at most 600 g/mol, at most 500 g/mol, at most 400 g/mol, at most 300 g/mol, at most 200 g/mol, or at most 150 g/mol.
43. The composition or kit according to any one of the preceding exemplary embodiments, wherein the pre-polymer comprises the residue of a polymeric aliphatic diol.
44. The composition or kit according to any one of the preceding exemplary embodiments, wherein the pre-polymer comprises a block comprising polysiloxane and a block comprising hydrophobic poly(alkylene oxide).
45. The composition or kit according to any one of the preceding exemplary embodiments, wherein at least 20 wt%, at least 30 wt%, at least 40 wt%, at least 50 wt%, at least 60 wt%, at least 70 wt%, at least 75 wt%, at wt 80 mol%, at wt 85 mol%, or at wt 90 mol%

of the blocks in the pre-polymer are blocks comprising polysiloxane or blocks comprising hydrophobic poly(alkylene oxide).

46. The composition or kit according to any one of the preceding exemplary embodiments, wherein at least 20 mol%, at least 30 mol%, at least 40 mol%, at least 50 mol%, at least 60 mol%, at least 70 mol%, at least 75 mol%, at least 80 mol%, at least 85 mol%, at least 90 mol%, at least 95 mol%, at least 98 mol%, or 100 mol% of the pre-polymer comprises the reaction product of i) an aliphatic diisocyanate and ii) a siloxane diol or a hydrophobic poly(alkylene oxide) diol.
47. The composition or kit according to any one of the preceding exemplary embodiments, wherein at least 20 mol%, at least 30 mol%, at least 40 mol%, at least 50 mol%, at least 60 mol%, at least 70 mol%, at least 75 mol%, at least 80 mol%, at least 85 mol%, at least 90 mol%, at least 95 mol%, at least 98 mol%, or 100 mol% of the pre-polymer comprises the reaction product of an aliphatic diisocyanate and a polysiloxane diol.
48. The composition or kit according to any one of the preceding exemplary embodiments, wherein at least 20 mol%, at least 30 mol%, at least 40 mol%, at least 50 mol%, at least 60 mol%, at least 70 mol%, at least 75 mol%, at least 80 mol%, at least 85 mol%, at least 90 mol%, at least 95 mol%, at least 98 mol%, or 100 mol% of the pre-polymer comprises the reaction product of an aliphatic diisocyanate and a hydrophobic poly(alkylene oxide) diol.
49. The composition or kit according to any one of the preceding exemplary embodiments, wherein the polymeric aliphatic diol comprises a hydroxy terminated poly(dimethylsiloxane) or hydroxylalkyl terminated poly(dimethylsiloxane).
50. The composition or kit according to any one of the preceding exemplary embodiments, wherein the pre-polymer comprises a block comprising poly(dimethylsiloxane).
51. The composition or kit according to any one of the preceding exemplary embodiments, wherein the pre-polymer comprises a block of polysiloxane having a Mn of at least 500 g/mol, at least 750 g/mol, at least 1000 g/mol, at least 1200 g/mol, or at least 1500 g/mol.
52. The composition or kit according to any one of the preceding exemplary embodiments, wherein the pre-polymer comprises a block of polysiloxane having a Mn of at most 10,000 g/mol, at most 7,500 g/mol, at most 5,000 g/mol, at most 3,000 g/mol, or at most 2,000 g/mol.
53. The composition or kit according to any one of the preceding exemplary embodiments, wherein the polymeric aliphatic diol comprises a hydrophobic poly(alkylene oxide) diol.
54. The composition or kit according to any one of the preceding exemplary embodiments, wherein the polymeric aliphatic diol consists of a hydrophobic poly(alkylene oxide) diol.

55. The composition or kit according to any one of the preceding exemplary embodiments, wherein the polymeric aliphatic diol comprises a hydrophobic poly(alkylene oxide) diol that comprises poly(propylene oxide) diol, poly(tetramethylene oxide) diol, or a diol that comprises a copolymer of poly(propylene oxide) and poly(tetramethylene oxide).
56. The composition or kit according to any one of the preceding exemplary embodiments, wherein the polymeric aliphatic diol comprises a poly(propylene oxide) diol , a poly(tetramethylene oxide) diol, or a copolymer diol of poly(propylene oxide) and poly(tetramethylene oxide).
57. The composition or kit according to any one of the preceding exemplary embodiments, wherein the polymeric aliphatic diol consists of a poly(propylene oxide) diol , a poly(tetramethylene oxide) diol, or a copolymer diol of poly(propylene oxide) and poly(tetramethylene oxide), or a mixture thereof.
58. The composition or kit according to any one of the preceding exemplary embodiments, wherein the polymeric aliphatic diol comprises a hydrophobic poly(alkylene oxide) diol having a number average molecule weight (Mn) of at least 150 g/mol, at least 200 g/mol, at least 250 g/mol, at least 300 g/mol, at least 350 g/mol, or at least 400 g/mol.
59. The composition or kit according to any one of the preceding exemplary embodiments, wherein the polymeric aliphatic diol comprises a hydrophobic poly(alkylene oxide) diol having a Mn of at most 1500 g/mol, at most 1200 g/mol, at most 1000 g/mol, at most 900 g/mol, at most 800 g/mol, at most 700 g/mol, at most 600 g/mol, at most 500 g/mol, or at most 450 g/mol.
60. The composition or kit according to any one of the preceding exemplary embodiments, wherein the polymeric aliphatic diol comprises a hydrophobic poly(alkylene oxide) diol and at least 50 mol%, at least 60 mol%, at least 70 mol%, at least 80 mol%, at least 90 mol%, or at least 100 mol% of the hydrophobic poly(alkylene oxide) diol backbone is propylene oxide and/or tetramethylene oxide.
61. The composition or kit according to any one of the preceding exemplary embodiments, wherein at least 50 mol%, at least 60 mol%, at least 70 mol%, at least 80 mol%, at least 90 mol%, or 100 mol% of blocks in the pre-polymer that comprise hydrophobic poly(alkylene oxide) comprises propylene oxide and/or tetramethylene oxide.
62. The composition or kit according to any one of the preceding exemplary embodiments, wherein the pre-polymer comprises the reaction product of a chain extender.
63. The composition or kit according to any one of the preceding exemplary embodiments, wherein the pre-polymer comprises the residue of a monomeric siloxane diol.
64. The composition or kit according to any one of the preceding exemplary embodiments, wherein the pre-polymer comprises the residue of a blend of monomeric and polymeric siloxane diols.

65. The composition or kit according to any one of the preceding exemplary embodiments, wherein the polymeric aliphatic diol consists of a polymeric siloxane diol.
66. The composition or kit according to any one of the preceding exemplary embodiments, wherein the pre-polymer comprises the residue of a monomeric siloxane diol that has a molecular weight of at least 200 g/mol or at least 300 g/mol.
67. The composition or kit according to any one of the preceding exemplary embodiments, wherein the pre-polymer comprises the residue of a monomeric siloxane diol that has a molecular weight of at most 600 g/mol or at most 500 g/mol.
68. The composition or kit according to any one of the preceding exemplary embodiments, wherein the pre-polymer comprises the residue of 1,3-bis(hydroxypropyl)tetramethyldisiloxane, 1,3-bis(3-hydroxyisobutyl)tetramethyldisiloxane, 1,3-bis(4-hydroxybutyl)tetramethyldisiloxane, or 1,3-bis(3-(2-hydroxyethoxy)propyl)tetramethyldisiloxane.
69. The composition or kit according to any one of the preceding exemplary embodiments, wherein the pre-polymer comprises the residue of a fluorinated diol.
70. The composition or kit according to any one of the preceding exemplary embodiments, wherein the pre-polymer comprises the residue of a fluoroalkyl or fluoroalkyl ether diol.
71. The composition or kit according to any one of the preceding exemplary embodiments, wherein the pre-polymer comprises a block comprising fluorine and a block comprising hydrophobic poly(alkylene oxide).
72. The composition or kit according to any one of the preceding exemplary embodiments, wherein the pre-polymer comprises the residue of 1H,1H,4H,4H-Perfluoro-1,4-butanediol, 1H,1H,5H,5H-Perfluoro-1,5-pentanediol, 1H,1H,6H,6H-perfluoro-1,6-hexanediol, 1H,1H,8H,8H-Perfluoro-1,8-octanediol, 1H,1H,9H,9H-Perfluoro-1,9-nonanediol, 1H,1H,10H,10H-Perfluoro-1,10-decanediol, 1H,1H,12H,12H-Perfluoro-1,12-dodecanediol, 1H,1H,8H,8H-Perfluoro-3,6-dioxaoctan-1,8-diol, 1H,1H,11H,11H-Perfluoro-3,6,9-trioxaundecan-1,11-diol. fluorinated triethylene glycol, or fluorinated tetraethylene glycol.
73. The composition or kit according to any one of the preceding exemplary embodiments, wherein the pre-polymer comprises the reaction product of at least 10 wt%, at least 15 wt%, or at least 20 wt% of an aliphatic diisocyanate; and at least 20 wt%, at least 30 wt%, at least 40 wt%, at least 50 wt%, at least 60 wt%, or at least 70 wt% of polymeric aliphatic diols that comprise a block comprising polysiloxane and/or a block comprising hydrophobic poly(alkylene oxide).
74. The composition or kit according to any one of the preceding exemplary embodiments, wherein the pre-polymer comprises the reaction product of at most 50 wt%, at most 40 wt%, or at most 30 wt% of an aliphatic diisocyanate; and at most 90 wt%, at most 80

wt%, at most 70 wt%, or at most 60 wt%, of polymeric aliphatic diols that comprise a block comprising polysiloxane and/or a block comprising hydrophobic poly(alkylene oxide).

75. The composition or kit according to any one of the preceding exemplary embodiments, wherein the pre-polymer comprises the reaction product of:
    a. at least 10 wt%, at least 15 wt%, or at least 20 wt% of the aliphatic diisocyanate, based on the total weight of the pre-polymer, and
    b. at least 30 wt%, at least 40 wt%, at least 50 wt%, at least 60 wt%, or at least 70 wt% of the polymeric aliphatic diol, based on the total weight of the pre-polymer.
76. The composition or kit according to any one of the preceding exemplary embodiments, wherein the pre-polymer comprises the reaction product of:
    a. at most 50 wt%, at most 40 wt%, or at most 30 wt% of the aliphatic diisocyanate, based on the total weight of the pre-polymer, and
    b. at most 90 wt%, at most 80 wt%, at most 70 wt%, or at most 60 wt%, of the polymeric aliphatic diol, based on the total weight of the pre-polymer.
77. The composition or kit according to any one of the preceding exemplary embodiments, wherein the composition or kit comprises at least 10 wt%, at least 20 wt%, at least 30 wt%, or at least 40 wt% of the pre-polymer, based on the total weight of the composition or kit.
78. The composition or kit according to any one of the preceding exemplary embodiments, wherein the composition or kit comprises at most 70 wt%, at most 60 wt%, at most 50 wt%, or at most 40 wt% of the pre-polymer, based on the total weight of the composition or kit.
79. The composition or kit according to any one of the preceding exemplary embodiments, further comprising a free aliphatic diol.
80. The composition or kit according to any one of the preceding exemplary embodiments, wherein the free aliphatic diol is polymeric.
81. The composition or kit according to any one of the preceding exemplary embodiments, wherein the free aliphatic diol is monomeric.
82. The composition or kit according to any one of the preceding exemplary embodiments, wherein the free aliphatic diol comprises a hydrophobic poly(alkylene oxide) diol.
83. The composition or kit according to any one of the preceding exemplary embodiments, wherein the free aliphatic diol comprises a chain extender.
84. The composition or kit according to any one of the preceding exemplary embodiments, wherein the free aliphatic diol comprises a poly(propylene oxide) diol, poly(tetramethylene oxide) diol, or a diol that comprises a copolymer of poly(propylene oxide) and poly(tetramethylene oxide).

85. The composition or kit according to any one of the preceding exemplary embodiments, wherein the free aliphatic diol is a hydrophobic poly(alkylene oxide) diol having a number average molecule weight (Mn) of at least 150 g/mol, at least 200 g/mol, at least 250 g/mol, at least 300 g/mol, at least 350 g/mol, or at least 400 g/mol.

86. The composition or kit according to any one of the preceding exemplary embodiments, wherein the free aliphatic diol is a hydrophobic poly(alkylene oxide) diol having a Mn of at most 1500 g/mol, at most 1200 g/mol, at most 1000 g/mol, at most 900 g/mol, at most 800 g/mol, at most 700 g/mol, at most 600 g/mol, at most 500 g/mol, or at most 450 g/mol.

87. The composition or kit according to any one of the preceding exemplary embodiments, wherein the free aliphatic diol is a hydrophobic poly(alkylene oxide) diol comprising a mixture of a hydrophobic poly(alkylene oxide) diol having a number average molecular weight of less than 500 g/mol and a free hydrophobic poly(alkylene oxide) diol having a number average molecular weight of greater than 600 g/mol.

88. The composition or kit according to any one of the preceding exemplary embodiments, further wherein the free aliphatic diol comprises a siloxane diol.

89. The composition or kit according to any one of the preceding exemplary embodiments, wherein the free aliphatic diol comprises a monomeric or polymeric siloxane diol.

90. The composition or kit according to any one of the preceding exemplary embodiments, wherein the free aliphatic diol comprises a blend of monomeric and polymeric siloxane diols.

91. The composition or kit according to any one of the preceding exemplary embodiments, wherein the free aliphatic diol consists of a monomeric siloxane diol.

92. The composition or kit according to any one of the preceding exemplary embodiments, wherein the free aliphatic diol consists of a polymeric siloxane diol.

93. The composition or kit according to any one of the preceding exemplary embodiments, wherein the free aliphatic diol consists of a blend of monomeric and polymeric siloxane diols.

94. The composition or kit according to any one of the preceding exemplary embodiments, wherein the free aliphatic diol comprises a monomeric siloxane diol that has a molecular weight of at least 200 g/mol or at least 300 g/mol.

95. The composition or kit according to any one of the preceding exemplary embodiments, wherein the free aliphatic diol comprises a monomeric siloxane diol that has a molecular weight of at most 600 g/mol or at most 500 g/mol

96. The composition or kit according to any one of the preceding exemplary embodiments, wherein the free aliphatic diol comprises 1,3-bis(hydroxypropyl)tetramethyldisiloxane, 1,3-bis(3-hydroxyisobutyl)tetramethyldisiloxane, 1,3-bis(4-

hydroxybutyl)tetramethyldisiloxane, or 1,3-bis(3-(2-hydroxyethoxy)propyl)tetramethyldisiloxane.

97. The composition or kit according to any one of the preceding exemplary embodiments, wherein the free aliphatic diol comprises a hydroxy terminated poly(dimethylsiloxane) or hydroxylalkyl terminated poly(dimethylsiloxane).

98. The composition or kit according to any one of the preceding exemplary embodiments, wherein the free aliphatic diol comprises a polysiloxane diol having a Mn of at least 1000 g/mol, at least 1200 g/mol, or at least 1500 g/mol.

99. The composition or kit according to any one of the preceding exemplary embodiments, wherein the free aliphatic diol comprises a polysiloxane diol having a Mn of at most 10,000 g/mol, at most 9,000 g/mol, at most 8,000 g/mol, at most 7,000 g/mol, at most 6,000 g/mol, or at most 5,000 g/mol.

100. The composition or kit according to any one of the preceding exemplary embodiments, wherein the free aliphatic diol comprises a fluorinated diol.

101. The composition or kit according to any one of the preceding exemplary embodiments, wherein the free aliphatic diol comprises 1H,1H,4H,4H-Perfluoro-1,4-butanediol, 1H,1H,5H,5H-Perfluoro-1,5-pentanediol, 1H,1H,6H,6H-perfluoro-1,6-hexanediol, 1H,1H,8H,8H-Perfluoro-1,8-octanediol, 1H,1H,9H,9H-Perfluoro-1,9-nonanediol, 1H,1H,10H,10H-Perfluoro-1,10-decanediol, 1H,1H,12H,12H-Perfluoro-1,12-dodecanediol, 1H,1H,8H,8H-Perfluoro-3,6-dioxaoctan-1,8-diol, or 1H,1H,11H,11H-Perfluoro-3,6,9-trioxaundecan-1,11-diol.

102. The composition or kit according to any one of the preceding exemplary embodiments, wherein the free aliphatic diol consists of 1H,1H,4H,4H-Perfluoro-1,4-butanediol, 1H,1H,5H,5H-Perfluoro-1,5-pentanediol, 1H,1H,6H,6H-perfluoro-1,6-hexanediol, 1H,1H,8H,8H-Perfluoro-1,8-octanediol, 1H,1H,9H,9H-Perfluoro-1,9-nonanediol, 1H,1H,10H,10H-Perfluoro-1,10-decanediol, 1H,1H,12H,12H-Perfluoro-1,12-dodecanediol, 1H,1H,8H,8H-Perfluoro-3,6-dioxaoctan-1,8-diol, 1H,1H,11H,11H-Perfluoro-3,6,9-trioxaundecan-1,11-diol, or a blend thereof.

103. The composition or kit according to any one of the preceding exemplary embodiments, wherein the free aliphatic diol is present in an amount of at least 2 wt%, at least 5 wt%, or at least 10 wt%, based on the total weight of the composition or kit.

104. The composition or kit according to any one of the preceding exemplary embodiments, wherein the free aliphatic diol is present in an amount of at most 40 wt%, at most 30 wt%, at most 20 wt%, or at most 10 wt%, based on the total weight of the composition or kit.

105. The composition or kit according to any one of the preceding exemplary embodiments, further comprising a free aliphatic diisocyanate.

106. The composition or kit according to any one of the preceding exemplary embodiments, wherein the free aliphatic diisocyanate is polymeric.

107. The composition or kit according to any one of the preceding exemplary embodiments, wherein the free aliphatic diisocyanate is monomeric.

108. The composition or kit according to any one of the preceding exemplary embodiments, wherein the free aliphatic diisocyanate comprises hexamethylene diisocyanate (HDI), hydrogenated methylene diphenyl diisocyanate (HMDI), or isophorone diisocyanate (IPDI).

109. The composition or kit according to any one of the preceding exemplary embodiments, wherein the free aliphatic diisocyanate consists of hexamethylene diisocyanate (HDI), hydrogenated methylene diphenyl diisocyanate (HMDI), or isophorone diisocyanate (IPDI), or a mixture thereof.

110. The composition or kit according to any one of the preceding exemplary embodiments, wherein the free aliphatic diisocyanate is present in an amount of at least 2 wt%, at least 5 wt%, or at least 10 wt%, based on the total weight of the composition or kit.

111. The composition or kit according to any one of the preceding exemplary embodiments, wherein the free aliphatic diisocyanate is present in an amount of at most 30 wt%, at most 20 wt%, at most 15 wt%, or at most 10 wt%, based on the total weight of the composition or kit.

112. The composition or kit according to any one of the preceding exemplary embodiments, wherein the polyol is a diol, triol, or tetraol.

113. The composition or kit according to any one of the preceding exemplary embodiments, wherein the polyol is a triol or tetraol.

114. The composition or kit according to any one of the preceding exemplary embodiments, wherein the polyol is a monomeric polyol.

115. The composition or kit according to any one of the preceding exemplary embodiments, wherein the polyol comprises glycerol, glycerol propoxylate, glycerol ethoxylate, 1,2,4-benzenetriol, 3-methyl-1,3,5-pentanetriol, pentaerythritol, pentaerythritol propoxylate, or pentaerythritol ethoxylate.

116. The composition or kit according to any one of the preceding exemplary embodiments, wherein the polyol comprises glycerol, glycerol propoxylate, pentaerythritol, or pentaerythritol propoxylate.

117. The composition or kit according to any one of the preceding exemplary embodiments, wherein the polyol consists of glycerol, glycerol propoxylate, pentaerythritol, pentaerythritol propoxylate, or a mixture thereof.

118. The composition or kit according to any one of the preceding exemplary embodiments, wherein the polyol consists of glycerol propoxylate, pentaerythritol propoxylate, or a mixture thereof.

119. The composition or kit according to any one of the preceding exemplary embodiments, wherein the polyol is a monomeric polyol and has a molecular weight of from 90 to 500 g/mol.

120. The composition or kit according to any one of the preceding exemplary embodiments, wherein the polyol is a monomeric polyol has a has molecular weight of from 90 to 280 g/mol.

121. The composition or kit according to any one of the preceding exemplary embodiments, wherein the polyol is present in an amount of at least 1 wt%, at least 1.5 wt%, at least 2 wt%, or at least 2.5 wt%, based on the total weight of the composition or kit.

122. The composition or kit according to any one of the preceding exemplary embodiments, wherein the polyol is present in an amount of at most 12 wt%, at most 10 wt%, or at most 8 wt%, based on the total weight of the composition or kit.

123. The composition or kit according to any one of the preceding exemplary embodiments, wherein the di-, tri-, or tetra- isocyanate functional monomer is a tri-, or tetra- isocyanate functional monomer.

124. The composition or kit according to any one of the preceding exemplary embodiments, wherein the di-, tri-, or tetra- isocyanate functional monomer comprises methylidynetri-p-phenylene triisocyanate, undecane-1,6,11-triyl triisocyanate, or silicon tetraisocyanate.

125. The composition or kit according to any one of the preceding exemplary embodiments, wherein the di-, tri-, or tetra- isocyanate functional monomer consists of methylidynetri-p-phenylene triisocyanate, undecane-1,6,11-triyl triisocyanate, silicon tetraisocyanate, or a mixture thereof.

126. The composition or kit according to any one of the preceding exemplary embodiments, wherein the di-, tri-, or tetra- isocyanate functional monomer is present in an amount of at least 1 wt%, at least 1.5 wt%, at least 2 wt%, or at least 2.5 wt%, based on the total weight of the composition or kit.

127. The composition or kit according to any one of the preceding exemplary embodiments, wherein the di-, tri-, or tetra- isocyanate functional monomer is present in an amount of at most 12 wt%, at most 10 wt%, or at most 8 wt%, based on the total weight of the composition or kit.

128. The composition or kit according to any one of the preceding exemplary embodiments, wherein the derivative of cellulose comprises cellulose acetate butyrate, cellulose acetate propionate, ethyl cellulose, methyl cellulose, or cellulose acetate.

129. The composition or kit according to any one of the preceding exemplary embodiments, wherein the derivative of cellulose consists of one or more of cellulose acetate butyrate, cellulose acetate propionate, ethyl cellulose, methyl cellulose, or cellulose acetate, or a mixture thereof.

130. The composition or kit according to any one of the preceding exemplary embodiments, wherein the derivative of cellulose comprises cellulose acetate butyrate or cellulose acetate propionate.

131. The composition or kit according to any one of the preceding exemplary embodiments, wherein the derivative of cellulose consists of one or more of cellulose acetate butyrate, cellulose acetate propionate, or a mixture thereof.

132. The composition or kit according to any one of the preceding exemplary embodiments, wherein the derivative of cellulose consists of cellulose acetate butyrate.

133. The composition or kit according to any one of the preceding exemplary embodiments, wherein the derivative of cellulose is present in an amount of at least 10 wt%, at least 15 wt%, at least 20 wt%, at least 25 wt%, at least 30 wt%, or at least 35 wt%, based on the total weight of the composition or kit.

134. The composition or kit according to any one of the preceding exemplary embodiments, wherein the derivative of cellulose is present in an amount of at most 50 wt%, at most 45 wt%, at most 40 wt%, at most 35 wt%, or at most 30 wt%, based on the total weight of the composition or kit.

135. The composition or kit according to any one of the preceding exemplary embodiments, wherein the derivative of cellulose is hydroxyl functional.

136. The composition or kit according to any one of the preceding exemplary embodiments, wherein the derivative of cellulose comprises a hydroxyl content of at least 0.5 wt%, at least 1 wt%, at least 1.25 wt%, at least 1.5 wt%, at least 1.755 wt%, or at least 2 wt%, based on the total weight of the derivative of cellulose.

137. The composition or kit according to any one of the preceding exemplary embodiments, wherein the derivative of cellulose comprises a hydroxyl content of at most 10 wt%, at most 7.5 wt%, at most 6 wt%, at most 5 wt%, at most 4 wt%, or at most 3 wt%, based on the total weight of the derivative of cellulose.

138. The composition or kit according to any one of the preceding exemplary embodiments, wherein the derivative of cellulose comprises cellulose comprising a butyryl substitution.

139. The composition or kit according to any one of the preceding exemplary embodiments, wherein the derivative of cellulose comprises a butyryl content of at least 10 wt%, at least 15 wt%, at least 20 wt%, at least 30 wt%, or at least 45 wt%, based on the total weight of the derivative of cellulose.

140. The composition or kit according to any one of the preceding exemplary embodiments, wherein the derivative of cellulose comprises a butyryl content of at most 60 wt%, at most 55 wt%, at most 45 wt%, or at most 40 wt%, based on the total weight of the derivative of cellulose.

141. The composition or kit according to any one of the preceding exemplary embodiments, wherein the derivative of cellulose comprises cellulose comprising a propionyl substitution.

142. The composition or kit according to any one of the preceding exemplary embodiments, wherein the derivative of cellulose comprises a propionyl content of at least 15 wt%, at least 20 wt%, at least 30 wt%, or at least 40 wt%, based on the total weight of the derivative of cellulose.

143. The composition or kit according to any one of the preceding exemplary embodiments, wherein the derivative of cellulose comprises a propionyl content of at most 60 wt%, at most 55 wt%, at most 50 wt%, or at most 45 wt%, based on the total weight of the derivative of cellulose.

144. The composition or kit according to any one of the preceding exemplary embodiments, wherein the derivative of cellulose comprises cellulose comprising an acetyl substitution and a butyryl or propionyl substitution.

145. The composition or kit according to any one of the preceding exemplary embodiments, wherein the derivative of cellulose comprises an acetyl content of at least 40 wt%, based on the total weight of the derivative of cellulose, and no other substitution.

146. The composition or kit according to any one of the preceding exemplary embodiments, wherein the derivative of cellulose comprises an acetyl content of at least 0.5 wt%, at least 1 wt%, at least 2 wt%, at least 3 wt%, at least 5 wt%, or at least 10 wt%, and a butyryl or propionyl substitution of at least 15 wt%, at least 20 wt%, or at least 25 wt%, both based on the total weight of the derivative of cellulose.

147. The composition or kit according to any one of the preceding exemplary embodiments, wherein the derivative of cellulose comprises an acetyl content of at most 30 wt%, at most 20 wt%, at most 15 wt%, at most 10 wt%, at most 5 wt%, or at most 3 wt%, and a butyryl or propionyl substitution of at least 15 wt%, at least 20 wt%, or at least 25 wt%, both based on the total weight of the derivative of cellulose.

148. The composition or kit according to any one of the preceding exemplary embodiments, wherein the derivative of cellulose comprises an acetyl content of at least 0.5 wt%, at least 1 wt%, at least 2 wt%, at least 3 wt%, at least 5 wt%, or at least 10 wt%, and a butyryl or propionyl substitution of at least 30 wt%, both based on the total weight of the derivative of cellulose.

149. The composition or kit according to any one of the preceding exemplary embodiments, wherein the derivative of cellulose comprises an acetyl content of at most 30 wt%, at most 20 wt%, at most 15 wt%, at most 10 wt%, at most 5 wt%, or at most 3 wt%, and a butyryl or propionyl substitution of at least 30 wt%, both based on the total weight of the derivative of cellulose.

150. The composition or kit according to any one of the preceding exemplary embodiments, wherein the derivative of cellulose has a Mn of at least 5000 g/mol, at least 10,000 g/mol, or at least 15,000 g/mol.

151. The composition or kit according to any one of the preceding exemplary embodiments, wherein the derivative of cellulose has a Mn of at most 80,000 g/mol, at most 70,000 g/mol, at most 60,000 g/mol, or at most 50,000 g/mol.

152. The composition or kit according to any one of the preceding exemplary embodiments, wherein the composition or kit further comprises a chain extender.

153. The composition or kit according to any one of the preceding exemplary embodiments, wherein the chain extender is an alkane diol having from 2 to 20 carbon atoms, wherein one or more carbon atoms may be substituted with oxygen.

154. The composition or kit according to any one of the preceding exemplary embodiments, wherein the chain extender has a molecular weight of at least 60 g/mol, at least 70 g/mol, at least 80 g/mol, at least 90 g/mol, or at least 100 g/mol.

155. The composition or kit according to any one of the preceding exemplary embodiments, wherein the chain extender has a molecular weight of at most 500 g/mol, at most from 400 g/mol, at most 300 g/mol, at most 200 g/mol, or at most 150 g/mol.

156. The composition or kit according to any one of the preceding exemplary embodiments, wherein the chain extender comprises ethylene glycol, diethylene glycol, propylene glycol, dipropylene glycol, 1,3-propanediol, 1,4-butanediol, 1,5-pentanediol, 1,6-hexanediol, or 1,8-octanediol.

157. The composition or kit according to any one of the preceding exemplary embodiments, wherein the chain extender is present in an amount of from 0 to 10 wt% of the composition or kit, based on the total weight of the composition or kit.

158. The composition or kit according to any one of the preceding exemplary embodiments, wherein the chain extender is present in an amount of from 2 to 10 wt% of the composition or kit, based on the total weight of the composition or kit.

159. The composition or kit according to any one of the preceding exemplary embodiments, wherein the composition or kit comprises less than 10 wt% of hydrophilic polymer.

160. The composition or kit according to any one of the preceding exemplary embodiments, wherein the composition or kit comprises less than 8 wt% of hydrophilic polymer or less than 5 wt% of hydrophilic polymer.

161. The composition or kit according to any one of the preceding exemplary embodiments, wherein the composition or kit is devoid of hydrophilic polymer.

162. The composition or kit according to any one of the preceding exemplary embodiments, wherein the composition or kit comprises less than 10 wt% of poly(ethylene oxide).

163. The composition or kit according to any one of the preceding exemplary embodiments, wherein the composition or kit comprises less than 8 wt% of poly(ethylene oxide)or less than 5 wt% of poly(ethylene oxide).

164. The composition or kit according to any one of the preceding exemplary embodiments, wherein the composition or kit is devoid of poly(ethylene oxide).

165. The composition or kit according to any one of the preceding exemplary embodiments, further comprising a catalyst.

166. The composition or kit according to any one of the preceding exemplary embodiments, further comprising a first or further hydroxyl terminated pre-polymer.

167. The composition or kit according to any one of the preceding exemplary embodiments, further comprising a further isocyanate terminated pre-polymer.

168. A composition formed by combing the elements of the kit according to any one of the preceding exemplary embodiments.

169. A method of forming a component, comprising the step of curing the composition according to any one of the preceding exemplary embodiments.

170. A method of forming a component comprising the steps of:

a. combining the elements of the kit according to any one of the preceding exemplary embodiments, thereby forming a composition, and

b. curing the composition.

171. A component formed from the composition, kit, or method according to any one of the preceding exemplary embodiments.

172. A component formed from the composition, kit, or method according to any one of the preceding exemplary embodiments, wherein the component has a thickness of from 1 micrometer to 1 millimeter.

173. A component formed from the composition, kit, or method according to any one of the preceding exemplary embodiments, wherein the component has a concave surface suitable to fit on a surface of the eye.

174. A component formed from the composition, kit, or method according to any one of the preceding exemplary embodiments, wherein the component has a refractive index of from 1.48 to 1.515.

175. A component formed from the composition, kit, or method according to any one of the preceding exemplary embodiments, wherein the component has a refractive index of from 1.48 to 1.50.

176. A component formed from the composition, kit, or method according to any one of the preceding exemplary embodiments, wherein the component has a refractive index of from 1.48 to 1.495.

177. A component formed from the composition, kit, or method according to any one of the preceding exemplary embodiments, wherein the component, after exposure to 95% relative humidity for 24 hours at 23 °C, has a water content of 10 wt% or less.

178. A component formed from the composition, kit, or method according to any one of the preceding exemplary embodiments, wherein the component has an elastic modulus of 500 MPa or greater.

179. A component formed from the composition, kit, or method according to any one of the preceding exemplary embodiments, wherein the component has a Shore D hardness of from 60 to 100.

180. A component formed from the composition, kit, or method according to any one of the preceding exemplary embodiments, wherein the component has a Shore D hardness of from 60 to 80.

181. A component formed from the composition, kit, or method according to any one of the preceding exemplary embodiments, wherein the component has a Tg of from 40 to 100 °C.

182. A method comprising the steps of:

a. providing a component formed from the composition, kit, or method according to any one of the preceding exemplary embodiments, and

b. overmolding a hydrogel over the component.

183. The method according to the previous exemplary embodiment, wherein the hydrogel is a silicone hydrogel.

184. A method comprising the steps of:

a. providing a component form from the composition, kit, or method according to any one of the preceding exemplary embodiments, and

b. mounting electrical circuity on the component.

185. A method comprising the steps of:
   a. providing a component formed from the composition, kit, or method according to any one of the preceding exemplary embodiments, and
   b. mounting electrical circuity on the component by flip chip mounting.

186. A method comprising the steps of:
   a. providing a component formed from the composition, kit, or method according to any one of the preceding exemplary embodiments, and
   b. mounting electrical circuity on the component by patterning a conductive material.

187. An ocular device comprising a component formed from the composition, method, or kit according to any one of the preceding exemplary embodiments.

188. An ocular device comprising:
   a. a component formed from the composition, method, or kit according to any one of the preceding exemplary embodiments, and
   b. an electrical circuit mounted on the component.

189. An ocular device comprising:
   a. a component formed from the composition, method, or kit according to any one of the preceding exemplary embodiments, and
   b. a hydrogel molded onto or around the component.

190. An ocular device comprising:
   a. a component formed from the composition, method, or kit according to any one of the preceding exemplary embodiments,
   b. an electrical circuit mounted on the component, and
   c. a hydrogel molded onto or around the component.

191. The ocular device according to the previous exemplary embodiment, further comprising a waterproof layer covering the electrical circuit and the component.

192. The ocular device according to any one of the previous exemplary embodiments, wherein the hydrogel is a silicone hydrogel.

Unless stated otherwise, any expression of wt% is based on the weight of the entire composition, in the case of a composition, or on the weight of the entire kit once all elements are combined, in case of a kit. The use of the terms “a” and “an” and “the” and similar referents in the context of describing the invention (especially in the context of the following claims) are to be construed to cover both the singular and the plural, unless otherwise indicated herein or clearly contradicted by context. The terms “comprising,” “having,” “including,” and “containing” are to be construed as open-ended terms (i.e., meaning “including, but not limited to,”) unless otherwise noted. Recitation of ranges of values herein are merely intended to serve as a

shorthand method of referring individually to each separate value falling within the range, unless otherwise indicated herein, and each separate value is incorporated into the specification as if it were individually recited herein. The use of any and all examples, or exemplary language (e.g., "such as") provided herein, is intended merely to better illuminate the invention and does not pose a limitation on the scope of the invention unless otherwise claimed. No language in the specification should be construed as indicating any non-claimed element as essential to the practice of the invention.

Preferred embodiments of this invention are described herein, including the best mode known to the inventors for carrying out the invention. Variations of those preferred embodiments may become apparent to those of ordinary skill in the art upon reading the foregoing description. The inventors expect skilled artisans to employ such variations as appropriate, and the inventors intend for the invention to be practiced otherwise than as specifically described herein. Accordingly, this invention includes all modifications and equivalents of the subject matter recited in the claims appended hereto as permitted by applicable law. While certain optional features are described as embodiments of the invention, the description is meant to encompass and specifically disclose all combinations of these embodiments unless specifically indicated otherwise or physically impossible.

Claims

1. A composition for forming a component of a rigid lens comprising:
    a. from 45 to 95 wt%, based on the total weight of the composition, of a thermosetting component comprising:
        i. an isocyanate terminated pre-polymer having an average of more than one isocyanate group per molecule and comprising the residue of an aliphatic diisocyanate, and i) the residue of a polymeric aliphatic diol and/or ii) the residue of a chain extender,
        ii. a polyol that is a monomeric polyol, or a propoxylate thereof,
    b. a thermoplastic component comprising from 5 to 55 wt%, based on the total weight of the composition, of a derivative of cellulose;
    wherein the isocyanate terminated pre-polymer has an average of more than two isocyanate groups per molecule or the polyol has an average of more than 2 hydroxyl groups per molecule.
2. A kit of materials that when combined form a composition for forming a component of a rigid lens, comprising:
    a. a first component comprising one or more isocyanate-functional components and devoid of hydroxyl-functional components, comprising:
        i. an isocyanate terminated pre-polymer having an average of more than one isocyanate group per molecule and comprising the residue of an aliphatic diisocyanate, and i) the residue of a polymeric aliphatic diol and/or ii) the residue of a chain extender,
    b. a second component comprising one or more hydroxyl-functional components and devoid of isocyanate-functional components, comprising:
        i. a polyol that is a monomeric polyol, or a propoxylate thereof,
        ii. from 5 to 55 wt%, based on the total weight of the composition, of a derivative of cellulose dissolved in the second component,
    wherein the isocyanate terminated pre-polymer has an average of more than two isocyanate groups per molecule or the polyol has an average of more than 2 hydroxyl groups per molecule.
3. The composition or kit according to any one of the previous claims, wherein the average number of isocyanate groups on the isocyanate terminated pre-polymer plus the average number of hydroxyl groups of the polyol is equal to at least 4.5.
4. The composition or kit according to any one of the previous claims, wherein the average number of isocyanate groups on the isocyanate terminated pre-polymer plus the average number of hydroxyl groups of the polyol is equal to at most 5.5.

5. The composition or kit according to any one of the previous claims, wherein the derivative of cellulose comprises cellulose acetate butyrate, cellulose acetate propionate, ethyl cellulose, methyl cellulose, or cellulose acetate.
6. The composition or kit according to any one of the previous claims, wherein the derivative of cellulose comprises cellulose acetate butyrate or cellulose acetate propionate.
7. The composition or kit according to any one of the previous claims, wherein the derivative of cellulose is present in an amount of at least 10 wt%, based on the total weight of the composition or kit.
8. The composition or kit according to any one of the previous claims, wherein the derivative of cellulose is hydroxyl functional.
9. The composition or kit according to any one of the previous claims, wherein the derivative of cellulose comprises a hydroxyl content of from 1 wt% to 5 wt%, based on the total weight of the derivative of cellulose.
10. The composition or kit according to any one of the previous claims, wherein the derivative of cellulose comprises cellulose comprising a butyryl substitution.
11. The composition or kit according to any one of the previous claims, wherein the derivative of cellulose comprises a butyryl content of from 30 wt% to 60 wt%, based on the total weight of the derivative of cellulose.
12. The composition or kit according to any one of the previous claims, wherein the derivative of cellulose comprises cellulose comprising a propionyl substitution.
13. The composition or kit according to any one of the previous claims, wherein the derivative of cellulose comprises a propionyl content of from 20 wt% to 60 wt%, based on the total weight of the derivative of cellulose.
14. The composition or kit according to any one of the previous claims, wherein the derivative of cellulose comprises cellulose comprising an acetyl substitution and a butyryl or propionyl substitution.
15. The composition or kit according to any one of the previous claims, wherein the derivative of cellulose comprises an acetyl content of from 1 wt% to 30 wt%, and a butyryl or propionyl substitution of at least 15 wt%, both based on the total weight of the derivative of cellulose.
16. The composition or kit according to any one of the previous claims, wherein the derivative of cellulose has a Mn of from 10,000 g/mol to 70,000 g/mol.
17. The composition or kit according to any one of the previous claims, wherein the polyol consists of glycerol propoxylate, pentaerythritol propoxylate, or a mixture thereof.

18. The composition or kit according to any one of the previous claims, wherein the pre-polymer is present in an amount of from 30 wt% to 70 wt%, and the polyol is present in an amount of from 1 wt% to 10 wt%, based on the total weight of the composition or kit.
19. A component formed from the composition or kit according to any one of the preceding claims, wherein the component has a refractive index of from 1.48 to 1.495 and a Tg of from 40 to 100 °C.
20. An ocular device comprising:
    a. a component formed from the composition, method, or kit according to any one of the preceding claims,
    b. an electrical circuit mounted on the component.

Figures

Fig. 1

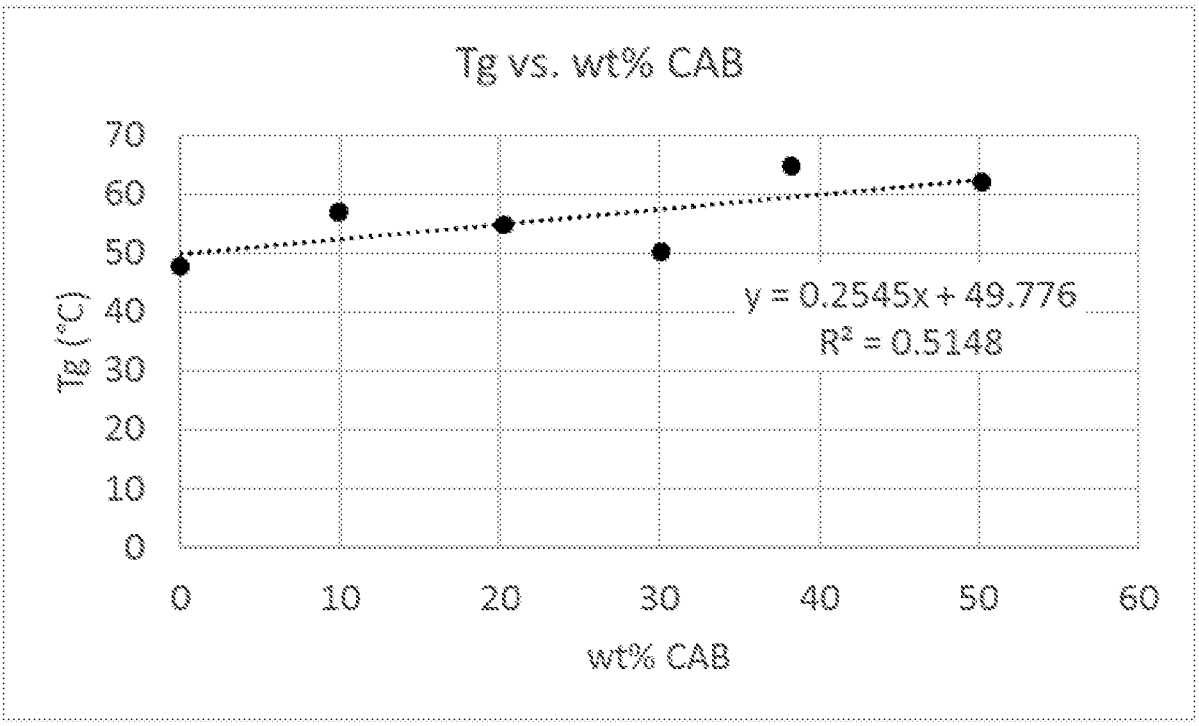
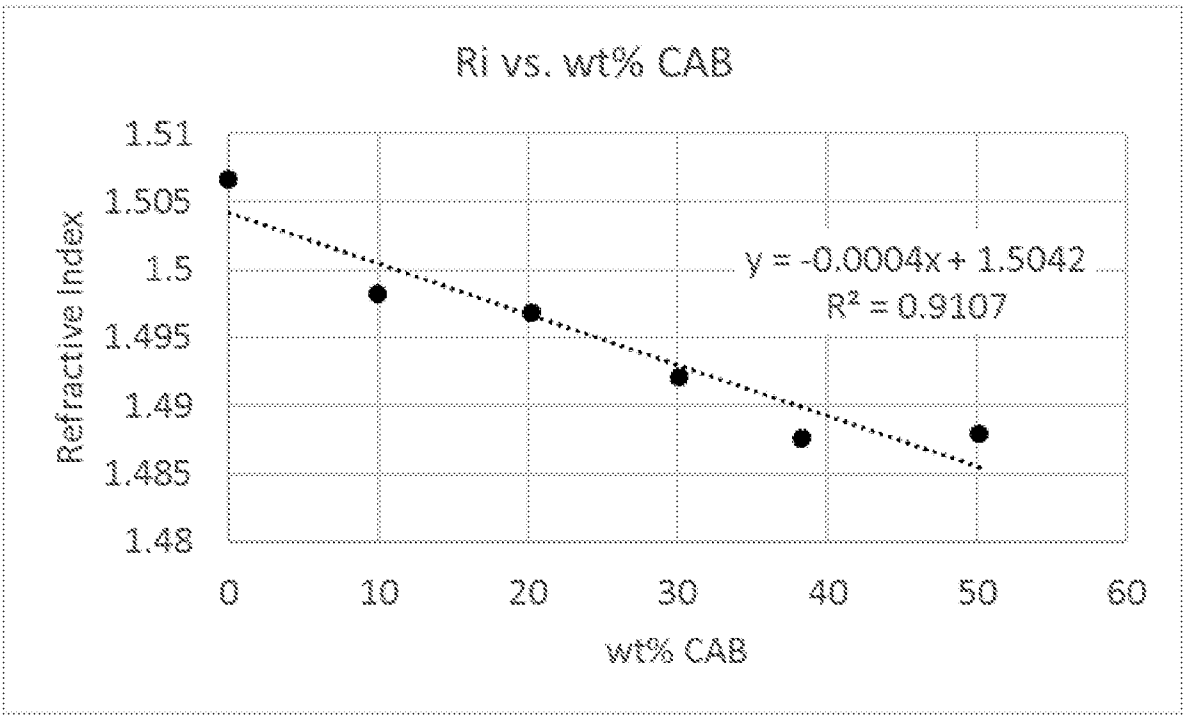


Fig. 2



INTERNATIONAL SEARCH REPORT

International application No
PCT/US2018/054059

A. CLASSIFICATION OF SUBJECT MATTER
INV. C08G18/10 C08G18/24 C09D175/04 C08G18/64 C08G18/66
C08G18/72 C08G18/78 C08G18/28 G02B1/04
ADD.
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
C09D C08G G02B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 2011/051690 A2 (OCUTEC LTD [GB]; RASHID ABDUL [GB]; BOWERS RODERICK WILLIAM JONATHAN [) 5 May 2011 (2011-05-05) page 1, lines 28-30; claims 1-2 page 6, lines 1-20 page 10, lines 4-9	1-20
Y	WO 96/10484 A1 (AVERY DENNISON CORP [US]) 11 April 1996 (1996-04-11) page 3, lines 8-16 page 11, line 26 - page 12, line 4	1-20
Y	EP 0 362 145 A2 (CIBA GEIGY AG [CH]) 4 April 1990 (1990-04-04) page 7, lines 4-7; examples 4,12,39 page 2, lines 42-43	1-20

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

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"P" document published prior to the international filing date but later than the priority date claimed

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
24 January 2019	01/02/2019

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Scheuer, Sylvie

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
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