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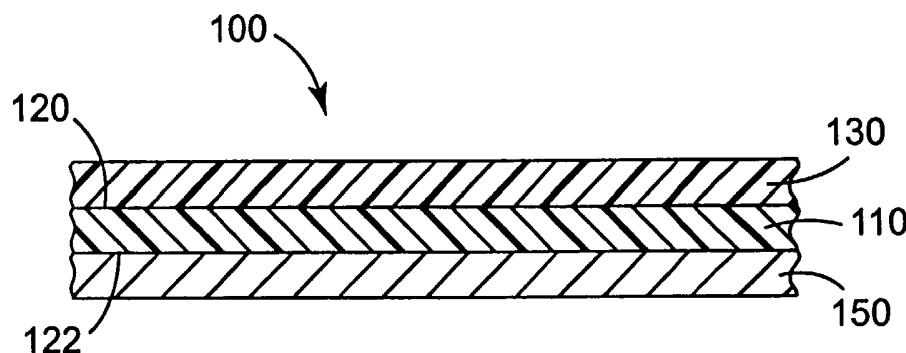
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(54) Title: METHOD OF MAKING ERASABLE ARTICLES AND ARTICLES THEREFROM



(57) Abstract: A method of making erasable article comprises: providing an electret film having first and second opposed major surfaces; applying a polymerizable precursor composition to at least a portion of the first major surface; polymerizing the polymerizable precursor composition to form a non-tacky crosslinked polymeric layer; and exposing the electret film and non-tacky crosslinked polymeric layer to a direct current corona discharge, wherein the second major surface is free of adhesive material. Erasable articles and kits containing them are also disclosed.



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## METHOD OF MAKING ERASABLE ARTICLES AND ARTICLES THEREFROM

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### TECHNICAL FIELD

The present invention relates to articles having an erasable writing surface.

### BACKGROUND

As commonly used, the term "dry erase" as applied to an article (for example, a  
10 white board) refers to the ability to write or mark on that article with ink (for example,  
using a felt tip marking pen), and later erase the ink without the need of a liquid cleaner.  
In practice, inks intended for use with dry erase surfaces are often specifically formulated  
for use with individual surface compositions, and may not be useful on all types of dry  
erase materials. Various dry erase articles are known, many of which are adapted to be  
15 mounted on a vertical surface using adhesive or mechanical fasteners (for example,  
screws, nails, hooks, etc.). However, mechanical fasteners and many adhesives are  
unsuitable for uses in which repositioning of the dry erase article is desired. Further,  
adhesives may not adhere well to contaminated surfaces such as those contaminated with  
oil and/or dust particles.

20

The term "cling film" is commonly used to refer to a film that can cling to a  
substrate without the use of adhesives or fasteners. Cling films are generally divided into  
two major types: cling vinyl films and electret films.

25

Cling vinyl films (also known as "static cling vinyl" films) typically contain  
plasticizers and/or tackifiers, and can typically be adhered to smooth, rigid surfaces such  
as glass windows, but may not adhere well to porous, rough and/or dusty surfaces. In  
addition, plasticizers and/or tackifiers that are present in cling vinyl films may diffuse out  
of the film and leave a residue on, or otherwise damage, a substrate to which the film is  
bonded.

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In contrast, electret films (that is, films having a permanent or semi-permanent  
electrostatic charge) typically adhere to surfaces by electrostatic attraction, typically do  
not require plasticizers or tackifiers, and may adhere well even to rough or dusty surfaces.  
Typically, such films are relatively inexpensive and can be repeatedly adhered to, and

removed from (for example, by peeling), surfaces without risk of leaving adhesive residue and/or physically damaging the substrate surface. Electret films typically outperform (for example, with regard to duration of cling, resistance to humidity, and the like) films having mere surface charges (for example, formed by contact charging). However, 5 electret films may not erase well, with and/or without a liquid cleaner, if used with a variety of inks. That is, such films may leave traces of the ink image (that is, ghosting), especially if used with ink not specifically adapted for use with the film.

It would be desirable to have erasable articles (for example, films) that can be successfully marked and erased (for example, dry erased) using a variety of inks, wherein 10 the articles can be repeatedly adhered to, and removed from, a wide range of substrates by electrostatic attraction.

### SUMMARY

In one aspect, the present invention provides a method of making an erasable 15 article comprising:

providing an electret film having first and second opposed major surfaces;  
applying a polymerizable precursor composition to at least a portion of the first major surface;

polymerizing the polymerizable precursor composition to form a non-tacky 20 crosslinked polymeric layer; and

exposing the electret film and non-tacky crosslinked polymeric layer to a direct current corona discharge,

wherein the second major surface is free of adhesive material.

In another aspect, the present invention provides an erasable article comprising an 25 electret film having first and second opposed major surfaces, and a non-tacky crosslinked polymeric layer comprising contacting the first major surface, wherein the non-tacky crosslinked polymeric layer comprises colloidal silica, and wherein the second major surface is free of adhesive material.

In another aspect, the present invention provides an erasable article comprising an 30 electret film having first and second opposed major surfaces, and a non-tacky crosslinked polymeric layer comprising contacting the first major surface, wherein the second major surface is free of adhesive material, and wherein the erasable article forms a roll.

In another aspect, the present invention provides a stack of erasable articles comprising a plurality of erasable articles superimposed on each other, wherein each erasable article comprises:

5 an electret film having first and second opposed major surfaces, and a non-tacky crosslinked polymeric layer comprising contacting the first major surface, wherein the second major surface is free of adhesive material.

In another aspect, the present invention provides an erasable article comprising:  
an electret film having first and second opposed major surfaces, and a non-tacky crosslinked polymeric layer contacting the first major surface, wherein the electret film  
10 and wherein the second major surface is free of adhesive material; and  
a liner, wherein the liner contacts the second major surface.

In another aspect, the present invention provides a kit comprising:  
an erasable article, wherein the erasable article comprises:  
an electret film having a first major surface and a second major surface; and  
15 a non-tacky crosslinked polymeric layer; and  
at least one of a marker, eraser, or liquid cleaner.

Erasable articles of the present invention can typically be repeatedly adhered to, and removed from, a wide range of substrates by electrostatic attraction, and may typically be marked and erased (for example, dry erased) using a variety of inks.

20 As used herein:

"film" refers to a continuous nonporous thin layer, and includes for example, rolls, sheets, tapes, and strips;

"removably adhered" means separable by peeling, without substantial damage (for example, tearing) to the objects being separated;

25 "(meth)acryl" includes acryl and methacryl; and

"ionomer" refers to a polymer having carboxyl groups wherein at least some of the acidic protons have been replaced (that is, neutralized) by metal ions.

#### BRIEF DESCRIPTION OF THE DRAWINGS

30 **FIG. 1** is a cross-sectional view of an exemplary erasable article according to one embodiment of the present invention;

**FIG. 2** is a perspective view of an exemplary erasable article in the form of a roll according to one embodiment of the present invention; and

**FIG. 3** is a perspective view of an exemplary stack of erasable sheets according to one embodiment of the present invention.

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#### DETAILED DESCRIPTION

One exemplary embodiment of an erasable article according to the present invention is illustrated in **FIG. 1**. Referring now to **FIG. 1**, erasable article **100** has electret film **110** with first and second opposed major surfaces **120** and **122**, respectively. Non-tacky crosslinked polymeric layer **130** contacts first major surface **120**, and removable liner **150** contacts second major surface **122**.

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In one exemplary embodiment, erasable articles according to the present invention may be provided, as shown in **FIG. 2**, in the form of roll **200**.

In one exemplary embodiment, erasable articles according to the present invention may be provided in the form of a stack of sheets as shown, for example, in **FIG. 3**, wherein stack **300** comprises a plurality of superimposed erasable articles **301**. In this embodiment, each erasable article **301** independently comprises electret film **110** with first and second opposed major surfaces **120** and **122**, respectively, and non-tacky crosslinked polymeric layer **130** which contacts first major surface **120**.

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Due to the inherent charge of the erasable articles, they typically self adhere to form a stack that may be handled as a single item.

20

Electret films, useful in practice of the present invention, typically comprise a thermoplastic polymeric material, optionally containing various fillers and additives.

Useful thermoplastic polymeric materials that can maintain an electret charge include fluorinated polymers (for example, polytetrafluoroethylene, polyvinylidene fluoride, tetrafluoroethylene-hexafluoropropylene copolymers, vinylidene fluoride-trifluorochloroethylene copolymers), polyolefins (for example, polyethylene, polypropylene, poly-4-methyl-1-pentene, propylene-ethylene copolymers), copolymers of olefins and other monomers (for example, ethylene-vinyl acetate copolymers, ethylene-acrylic acid copolymers, ethylene-maleic acid anhydride copolymers, propylene-acrylic acid copolymers, propylene-maleic acid anhydride copolymers, 4-methyl-1-pentene-acrylic acid copolymers, 4-methyl-1-pentene-maleic acid anhydride copolymers),

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ionomers (for example, ethylene-(meth)acrylic acid copolymers with at least some acidic protons replaced by  $\text{Na}^+$ ,  $\text{K}^+$ ,  $\text{Ca}^{2+}$ ,  $\text{Mg}^{2+}$ , or  $\text{Zn}^{2+}$  cations), polyesters (for example, polyethylene terephthalate), polyamides (for example, nylon-6, nylon-6,6), polycarbonates, polysulfones, non-plasticized polyvinyl chloride, blends and mixtures thereof, and the like. Preferably, the thermoplastic material comprises at least one of polypropylene or a poly(ethylene-co-methacrylic acid) ionomer, more preferably a poly(ethylene-co-methacrylic acid) ionomer, more preferably a zinc poly(ethylene-co-methacrylic acid) ionomer.

Many poly(ethylene-co-(meth)acrylic acid) ionomers are commercially available as pellets and/or films, for example, as marketed under the trade designation "SURLYN" (for example, lithium poly(ethylene-co-methacrylic acid) ionomers such as "SURLYN 7930", "SURLYN 7940"; sodium poly(ethylene-co-methacrylic acid) ionomers such as "SURLYN 1601", "SURLYN 8020", "SURLYN 8120", "SURLYN 8140", "SURLYN 8150", "SURLYN 8320", "SURLYN 8527", "SURLYN 8660", "SURLYN 8920", "SURLYN 8940", "SURLYN 8945"; zinc poly(ethylene-co-methacrylic acid) ionomers such as "SURLYN 1705-1", "SURLYN 1706", "SURLYN 6101", "SURLYN 9020", "SURLYN 9120", "SURLYN 9150", "SURLYN 9320W", "SURLYN 9520", "SURLYN 9650", "SURLYN 9720", "SURLYN 9721", "SURLYN 9910", "SURLYN 9945", "SURLYN 9950", "SURLYN 9970", "SURLYN PC-100") by E. I. du Pont de Nemours & Company, Wilmington, Delaware; or as marketed under the trade designation "IOTEK" (for example, sodium poly(ethylene-co-acrylic acid) ionomers such as "IOTEK 3110", "IOTEK 3800", or "IOTEK 8000"; and zinc poly(ethylene-co-acrylic acid) ionomers such as "IOTEK 4200") by ExxonMobil Corporation, Houston, Texas. Further details of useful poly(ethylene-co-(meth)acrylic acid) ionomers are described in, for example, commonly assigned U.S. Patent Application entitled "METHOD OF ADHERING A FILM AND ARTICLES THEREFROM" (Bharti et al.), U.S. Serial No 10/231,570, filed August 30, 2002.

If the polymer is obtained in pellet form, the pellets may be melt-extruded as a film using procedures well known in the film art. Typically, the thickness of the electret film is in the range of from 10 to 2500 micrometers, although thinner and thicker films may also be used. Preferably, the electret film has a thickness in the range of from 25 to 310 micrometers, more preferably in the range of from 50 to 110 micrometers.

Optionally, one or more additives can be included in the thermoplastic polymer. Exemplary optional additives include antioxidants, light stabilizers (for example, as available from Ciba Specialty Chemicals, Tarrytown, New York under the trade designations "CHIMASSORB 2020", "CHIMASSORB 119", "CHIMASSORB 944",  
5 "TINUVIN 783", or "TINUVIN C 353"), thermal stabilizers (for example, as available from Ciba Specialty Chemicals under the trade designations "IRGANOX 1010", "IRGANOX 1076"), fillers (for example, inorganic or organic), charge control agents (for example, as described in U.S. Pat. No. 5,558,809 (Groh et al.)), fluorochemical additives (for example, as described in U.S. Pat. Nos. 5,976,208 (Rousseau et al.) and 6,397,458  
10 (Jones et al.)), glass beads, glass bubbles, colorants (for example, dyes, pigments (including phosphorescent pigments), and fragrances.

Exemplary optional additives also include titanium dioxide (for example, in particulate form). If present, the amount of titanium dioxide preferably is in a range of from 1 to 50 percent by volume, more preferably in a range of from 1 to 20 percent by  
15 volume, based on the total volume of the film, although greater and lesser amounts of titanium dioxide particles may also be used.

The electret film may be a unitary film (that is, a single layer) or it may be multi-layered. The electret film may be opaque, transparent, or translucent, and may have distinct regions of differing opacity. The electret film may be perforated.

20 Preferably, the electret film is free of tackifiers and/or plasticizers.

Electret films can be readily obtained from commercial sources or prepared by a variety of methods that are well known in the art. For details on methods for making electret films, see, for example, "Electrets", G. M. Sessler (ed.), Springer-Verlag, New York, 1987. Exemplary methods of forming electrets are well known in the art and  
25 include thermal electret, electroelectret (for example, direct current (that is, DC) corona discharge), radioelectret, magnetoelectret, photoelectret, and mechanical electret forming methods as described in, for example, U.S. Pat. No. 5,558,809 (Groh et al.). Typically, electret films utilized in practice of the present invention have a charge (that is, electret charge) density of greater than 0.05 nanocoulombs per square centimeter ( $\text{nC/cm}^2$ ),  
30 preferably greater than  $0.5 \text{ nC/cm}^2$ , more preferably greater than about  $5 \text{ nC/cm}^2$ . DC corona charging (for example, as described in, for example, U.S. Pat. Nos. 6,001,299 (Kawabe et al.) and 4,623,438 (Felton et al.)), is a desirable and convenient method for

preparing electret films that are useful in practice of the present invention. Exemplary commercially available electret films include polypropylene electret films available under the trade designation "CLINGZ" from Permacharge Corporation, Rio Rancho, New Mexico.

5           In some embodiments of the present invention, for example, those in which strong bonding is undesirable (for example, bonding to fragile substrates), it may be preferable that one or more exposed surfaces of the electret article (for example, the electret film itself or laminate thereof) be free of adhesive or latent adhesive that might accidentally, or by design, strongly adhere to the substrate over time.

10           The non-tacky crosslinked polymeric layer typically provides a receptive surface for inks, while simultaneously providing erasability. The non-tacky crosslinked polymeric layer may be formed by polymerizing a precursor composition, although other methods (for example, crosslinking of a polymer or blend thereof using chemical means or ionizing radiation) may also be used. Useful precursor compositions typically comprise one or  
15           more polymerizable materials (for example, monomers and/or oligomers, which may be monofunctional and/or polyfunctional), a curative, and optionally inorganic particles. Polymerizable materials may be, for example, free-radically polymerizable, cationically polymerizable, and/or condensation polymerizable. Useful polymerizable materials include, for example, acrylates and methacrylates, epoxies, polyisocyanates, and  
20           trialkoxysilane terminated oligomers and polymers. Preferably, the polymerizable material comprises a free-radically polymerizable material.

          Useful free-radically polymerizable materials include, for example, free-radically polymerizable monomers and/or oligomers, either or both of which may be monofunctional or multifunctional. Exemplary free-radically polymerizable monomers  
25           include styrene and substituted styrenes (for example,  $\alpha$ -methylstyrene); vinyl esters (for example, vinyl acetate); vinyl ethers (for example, butyl vinyl ether); N-vinyl compounds (for example, N-vinyl-2-pyrrolidone, N-vinylcaprolactam); acrylamide and substituted acrylamides (for example, N,N-dialkylacrylamides); and acrylates and/or methacrylates (that is, collectively referred to herein as (meth)acrylates) (for example, isooctyl  
30           (meth)acrylate, nonylphenol ethoxylate (meth)acrylate, isononyl (meth)acrylate, diethylene glycol (meth)acrylate, isobornyl (meth)acrylate, 2-(2-ethoxyethoxy)ethyl (meth)acrylate, 2-ethylhexyl (meth)acrylate, lauryl (meth)acrylate, butanediol

mono(meth)acrylate,  $\beta$ -carboxyethyl (meth)acrylate, isobutyl (meth)acrylate, 2-hydroxyethyl (meth)acrylate, (meth)acrylonitrile, isodecyl (meth)acrylate, dodecyl (meth)acrylate, n-butyl (meth)acrylate, methyl (meth)acrylate, hexyl (meth)acrylate, (meth)acrylic acid, stearyl (meth)acrylate, hydroxy functional polycaprolactone ester (meth)acrylate, hydroxyethyl (meth)acrylate, hydroxymethyl (meth)acrylate, hydroxypropyl (meth)acrylate, hydroxyisopropyl (meth)acrylate, hydroxybutyl (meth)acrylate, hydroxyisobutyl (meth)acrylate, tetrahydrofurfuryl (meth)acrylate, ethylene glycol di(meth)acrylate, hexanediol di(meth)acrylate, triethylene glycol di(meth)acrylate, 1,3-propylene glycol di(meth)acrylate, tetraethylene glycol di(meth)acrylate, trimethylolpropane tri(meth)acrylate, 1,4-cyclohexanediol di(meth)acrylate, 1,5-pentanediol di(meth)acrylate, ethoxylated trimethylolpropane tri(meth)acrylate, glycerol tri(meth)acrylate, pentaerythritol tri(meth)acrylate, pentaerythritol tetra(meth)acrylate, dipentaerythritol penta(meth)acrylate, and neopentyl glycol di(meth)acrylate).

Exemplary free-radically polymerizable oligomers include those marketed by UCB Chemicals, Smyrna, Georgia (for example, under the trade designation "EBECRYL"), and those marketed by Sartomer Company, Exton, Pennsylvania (for example, under the trade designations "KAYARAD" or "CN").

For some applications, it may also be useful to include unsaturated fluorinated material such as, for example, one or more fluoroalkyl (meth)acrylates in the polymerizable material. If incorporated in the polymerizable material, the amount of fluorinated material is typically chosen such that dry erase marker inks can effectively wet out the non-tacky crosslinked polymeric layer surface (that is, the inks do not bead up on the surface).

Depending on the choice of polymerizable material, the precursor composition may, optionally, contain one or more curatives that assist in polymerizing the polymerizable material. The choice of curative for specific polymerizable materials depends on the chemical nature of the copolymerizable material. For example, in the case of epoxy resins, one would typically select a curative known for use with epoxy resins (for example, dicyandiamide, onium salt, polymercaptan). In the case of free-radically polymerizable resins, free radical thermal initiators and/or photoinitiators are useful curatives.

Typically, the optional curative(s) is used in an amount effective to facilitate polymerization of the monomers and the amount will vary depending upon, for example, the type of curative, the molecular weight of the curative, and the polymerization process. The optional curative(s) is typically included in the precursor composition in an amount in  
5 a range of from 0.01 percent by weight to 10 percent by weight, based on the total weight of the precursor composition, although higher and lower amounts may also be used. The precursor composition may be cured, for example, by exposure to a thermal source (for example, heat, infrared radiation), electromagnetic radiation (for example, ultraviolet and/or visible radiation), and/or particulate radiation (for example, electron beam).

10 If the optional curative is a free-radical initiator, the amount of curative is preferably in a range of from 1 percent by weight to 5 percent by weight, based on the total weight of the precursor composition, although higher and lower amounts may also be used. Useful free-radical photoinitiators include, for example, benzoin ethers such as benzoin methyl ether and benzoin isopropyl ether, substituted benzoin ethers (for example,  
15 anisoin methyl ether), substituted acetophenones (for example, 2,2-dimethoxy-2-phenylacetophenone), substituted alpha-ketols (for example, 2-methyl-2-hydroxypropionophenone), benzophenone derivatives (for example, benzophenone), and acylphosphine oxides. Exemplary commercially available photoinitiators include photoinitiators available under the trade designation "IRGACURE" (for example,  
20 "IRGACURE 651", "IRGACURE 184", "IRGACURE 819") or "DAROCUR" (for example, "DAROCUR 1173", "DAROCUR 4265") from Ciba Specialty Chemicals, Tarrytown, New York, and under the trade designation "LUCIRIN" (for example, "LUCIRIN TPO") from BASF, Parsippany, New Jersey.

Exemplary free-radical thermal initiators include peroxides such as benzoyl  
25 peroxide, dibenzoyl peroxide, dilauryl peroxide, cyclohexane peroxide, methyl ethyl ketone peroxide, hydroperoxides, for example, tert-butyl hydroperoxide and cumene hydroperoxide, dicyclohexyl peroxydicarbonate, t-butyl perbenzoate, and azo compounds, for example, 2, 2'-azo-bis(isobutyronitrile).

The precursor composition may, optionally, include inorganic particles (for  
30 example, dispersed in a mixture of polymerizable material and curative). Exemplary inorganic particles include silica particles, preferably in colloidal form.

Colloidal silicas dispersed as sols in aqueous solutions are available commercially under the trade designations "LUDOX" (E. I. du Pont de Nemours and Company, Wilmington, Delaware), "NYACOL" (Nyacol, Ashland, Massachusetts), and "NALCO" (Nalco Chemical Company, Oak Brook, Illinois). Non-aqueous silica sols (for example, silica organosols) are also commercially available under such trade names as "NALCO 1057" (a silica sol in 2-propoxyethanol, Nalco Chemical Company), and "MA-ST", "IP-ST", and "EG-ST", (Nissan Chemical Industries, Tokyo, Japan). The silica particles preferably have an average particle diameter in a range of from 5 nanometers (nm) to 1000 nm, more preferably in a range of from 10 nm to 50 nm. If present, colloidal silica particles are preferably covalently bonded, directly or indirectly, to one or more (meth)acrylate groups.

If utilized, colloidal silica particles typically are present in the polymerizable material in an amount of from 10 percent by weight to 50 percent by weight, based on the total weight of colloidal silica particles and polymerizable material, although higher and lower amounts may also be useful. Preferably, colloidal silica particles are present in the polymerizable material in an amount of from 25 percent by weight to 40 percent by weight.

Optionally, one or more additives may be mixed with the polymerizable material and optional curative prior to curing. Exemplary useful additives include colorants (for example, pigments, dyes), fillers, ultraviolet (UV) absorbing agents, antiblocking agents, flame retardant agents, plasticizers, light stabilizers, heat stabilizers, and slip agents.

Further details regarding polymerizable materials, curatives, and inorganic particles may be found in, for example, U.S. Pat. Nos. 5,258,225 (Katsamberis), 5,391,210 (Bilkadi et al.), and 5,677,050 (Bilkadi et al).

The non-tacky crosslinked polymeric layer may be affixed to a polymeric film by any suitable means known in the art, including, for example, coating a precursor composition (for example, roll coating, gravure coating, rod coating, spraying, spin coating, dip coating, curtain coating) onto a surface of a polymer film and subsequently polymerizing the precursor composition as described hereinabove.

Typically, the non-tacky crosslinked polymeric layer has a thickness in a range of from 0.5 micrometers to 20 micrometers, preferably in a range of from 2 micrometers to 14 micrometers, more preferably in a range of from 3 micrometers to 8 micrometers,

although other thicknesses may be used. Thicker non-tacky crosslinked polymeric layers may cause unacceptable curling of erasable article (for example, as may result from shrinkage during polymerization of the polymerizable material).

Typically, the non-tacky crosslinked polymeric layer is relatively smooth, although  
5 rough non-tacky crosslinked polymeric layers may also be useful. For example, the non-tacky crosslinked polymeric layer may have an average surface roughness Ra (that is, the average of the absolute distance between the middle value and the actual surface) of less than 200 nanometers, preferably less than 150 nanometers, more preferably less than 100 nanometers. Ra can be readily determined by optical interferometry, for example, using  
10 commercially available equipment such that marketed by Veeco Instruments, Woodbury, New York, under the trade designation "WYKO HD3300 HEAD MEASUREMENT SYSTEM".

As hardness tends to increase with crosslink density, useful non-tacky crosslinked polymeric layers may have a scratch hardness (that is, pencil hardness), according to  
15 ASTM D 3363 – 00 (2000), using a 50 micrometer thick film on a rigid borosilicate glass substrate, of at least 2H, preferably at least 4H, more preferably at least 6H, although lesser values may also be used.

In one embodiment of the invention, the surface of the electret film contacts a substrate. Any solid substrate may be used in practicing the present invention. The  
20 substrate may be conductive or nonconductive. Preferably, at least the portion of the surface of the substrate that contacts the electret film is substantially planar. As used herein, the term "substantially planar" encompasses surfaces that are generally planar in appearance, optionally having minor irregularities, imperfections, and/or warpage. Suitable substrates may have vertical and/or horizontal surfaces, and may be painted or  
25 unpainted. Exemplary substrates include liners (for example, papers, thermoplastic polymer films); multilayer optical films (for example, as described in for example U.S. Pat. Nos. 5,825,543 (Ouderkirk et al.) and 5,783,120 (Ouderkirk et al.), architectural surfaces (for example, floors, walls, ceilings), glass (for example, windows, mirrors), metal, drywall, plaster, motor vehicles (for example, automobiles, trucks, motorcycles),  
30 trailers (for example, truck trailers), mobile homes, boats, furniture (for example, wicker furniture), boxes, cabinets, mats, wall hangings, doors, dishes (for example, glasses, plates, and ceramic dishes), ceramic tile, photographs, banners, balloons, signs, paper, and

cloth. Preferably, the substrate is non-conductive (that is, a dielectric), although this is not a requirement.

Typically, erasable articles of the present invention may be removably adhered to a substrate by contacting them the substrate, sliding them to the desired orientation and position, and then smoothing out wrinkles and/or bubbles. After smoothing, the erasable article is preferably rubbed (for example, with a woven or nonwoven cloth) as described in commonly assigned U.S. Patent Application entitled "METHOD FOR ELECTROSTATICALLY ADHERING AN ARTICLE TO A SUBSTRATE" (Bharti et al.), U.S. Serial No. 10/232,259, filed August 30, 2002. Such rubbing typically serves to increase the level of shear adhesion between the electret film and the substrate.

Erasable articles of the present invention may, optionally, include ink layers and/or printed images such as for example, a continuous ink layer, ornamental designs, and/or indicia (for example, artistic border, letters, grid lines). Optional ink layers and/or printed images may contain one or more of any known inks (for example, colored inks, phosphorescent inks, infrared inks). Suitable printing methods and inks are well known and/or commercially available. Exemplary printing methods include flexographic printing, ink jet printing, electrostatic printing, gravure printing, screen printing, and thermal transfer printing. Optional printing may be disposed, for example, on the surface of the non-tacky crosslinked polymeric layer, between the non-tacky crosslinked polymeric layer and the electret film (for example, as a continuous ink layer), or on an uncoated surface of the electret film.

In one embodiment of the present invention, erasable articles may be combined in kit form with one or more items that would be used in conjunction with erasable articles. Exemplary items include one or more markers (for example, felt tip markers, dry erase markers), erasers, cloths, and liquid cleaners (for example, in a spray bottle). While erasable articles of the present invention may be used with markers having any type of ink, preferably they are used with markers containing aqueous inks.

The present invention will be more fully understood with reference to the following non-limiting examples in which all parts, percentages, ratios, and so forth, are by weight unless otherwise indicated.

5

### EXAMPLES

Unless otherwise noted, all reagents used in the examples were obtained, or are available from, general chemical suppliers such as Aldrich Chemical Co., Milwaukee, Wisconsin, or may be synthesized by known methods.

1,6-Hexanediol diacrylate was obtained under the trade designation "SR 238" from Sartomer Company, Exton, Pennsylvania; pentaerythritol tetraacrylate was obtained under the trade designation "SR 295" from Sartomer Company; and 2-hydroxy-2-methyl-1-phenylpropan-1-one was obtained under the trade designation "DAROCUR 1173" from Ciba Specialty Chemicals, Tarrytown, New York.

#### Preparation of Precursor Composition HC1

Precursor composition HC1 was prepared by combining 10 grams (g) of 1,6-hexanediol diacrylate with 10 g of pentaerythritol tetraacrylate in a dark brown wide-mouth jar. The jar was sealed and then shaken briefly by hand to mix the contents. 2-Hydroxy-2-methyl-1-phenylpropan-1-one (0.4 g) was added to the monomer mixture, and the jar was again briefly shaken to mix the contents. When the mixture appeared to be homogeneous, 20 g of 2-propanol was added to the jar, and the jar was then capped and shaken briefly by hand to thoroughly mix its contents.

#### Preparation of Precursor Compositions HC2-HC5

Precursor Composition HC2 was obtained under the trade designation "3M 906 ABRASION RESISTANT COATING" as a 50 percent by weight mixture of acrylate monomers and colloidal silica in isopropanol from 3M Company, St. Paul, Minnesota. Precursor Compositions HC3, HC4, and HC5 were made by dilution of HC2 with isopropanol as follows: HC3 (60 percent by weight isopropanol), HC4 (70 percent by weight isopropanol), HC5 (80 percent by weight isopropanol).

### Preparation of Film A

Zinc polyethylene-methacrylic acid ionomer pellets (78 parts, obtained under the trade designation "SURLYN 1705-1" from E. I. du Pont de Nemours & Company, Wilmington, Delaware), and 22 parts of a mixture of 15.4 parts titanium dioxide dispersed in 6.6 parts polyethylene (obtained under the trade designation "STANDRIDGE 11937 WHITE CONCENTRATE" from Standridge Color, Bridgewater, New Jersey) were combined and extruded onto a polyester liner (2 mils (50 micrometers) thickness) using a 2.5 inch (6.4 cm) single screw extruder (model number: 2.5TMIII-30, obtained from HPM Corporation, Mount Gilead, Ohio), at a temperature of 199 °C, resulting in a film having a thickness of 3 mils (80 micrometers) adhered to a polyester liner (2 mils (50 micrometers) thickness).

### Preparation of Film B

Film B was a 3-layer biaxially oriented (7 by 7) film made by simultaneous 3-layer coextrusion. The two outer layers had a thickness of 0.005 mils (0.1 micrometers) and consisted of polypropylene (obtained under the trade designation "FINA-3376" from Atofina Petrochemicals, Houston, Texas). The central layer consisted of 5 percent by weight titanium dioxide in 95 percent by weight polypropylene (FINA-3376). The total film thickness was 1.85 mils (47 micrometers).

The markers used in the Examples were obtained from commercial sources, and are identified as follows:

Markers A1 and A1', black and red, respectively, were obtained under the trade designation "MARKS-A-LOT EVERBOLD WHITEBOARD MARKER" from Avery Dennison Corporation, Pasadena, California;

Markers A2 and A2', black and red, respectively, were obtained under the trade designation "MARKS-A-LOT PERMANENT MARKER" from Avery Dennison Corporation;

Markers B1 and B1', orange and purple, respectively, were obtained under the trade designation "BOONE SCREAMERS DRY ERASE MARKER" from Boone International Corporation, Corona, California;

Markers B2 and B2', black and green, respectively, were obtained under the trade designation "BOONE LOW ODOR DRY ERASE MARKER" from Boone International Corporation;

Markers D1 and D1', black and blue, respectively, were obtained under the trade designation "DIXON DRY ERASE WHITE BOARD MARKER" from Dixon Ticonderoga Company, Heathrow, Florida;

Markers E1 and E1', black and blue, respectively, were obtained under the trade designation "LIQUID EXPO DRY ERASE MARKER" from Sanford Corporation, Bellwood, Illinois;

Markers E2 and E2', black and red, respectively, were obtained under the trade designation "EXPO LOW ODOR DRY ERASE MARKER" from Sanford Corporation;

Markers E3 and E3', black and green, respectively, were obtained under the trade designation "EXPO DRY ERASE MARKER" from Sanford Corporation; and

Markers S1 and S1', black and red, respectively, were obtained under the trade designation "SANFORD SHARPIE PERMANENT MARKER" from Sanford Corporation.

#### Dry Erase Test

The uncoated side of a pair of approximately 8.5 inches by 11 inches (22 cm by 28 cm) samples of each comparative and exemplary film was electrostatically adhered to the surface of 40-point white paperboard obtained under the trade designation "CRESCENT PAPERBOARD" obtained from Unisource Worldwide, Brooklyn Park, Minnesota, which had larger dimensions than the film being tested. The exposed coated side of each film was cleaned with liquid cleaner obtained under the trade designation "EXPO WHITE BOARD CLEANER" from Sanford Corporation. The cleaned coated surface of each of the two film samples was then marked by writing on it with each of the markers listed above. One of the pair of films was stored for 1 day at a temperature of 23 °C whereas the other of the pair of films was stored for 3 days at a temperature of 49 °C.

The marked film samples were evaluated for erasability by rubbing the marked surface of the films with an eraser obtained from Sanford Corporation, Bellwood, Illinois, under the trade designation "EXPO ERASER FOR DRY ERASE SURFACES". The marked films were rubbed by hand with the eraser, using moderate pressure, in a back and

forth motion until either the marking was completely erased or until ten back and forth motions had been completed. The film samples were then visually evaluated and rated for erasability according to the following scale, as reported in Table 2: 1 = rubbing with the eraser had no effect on the marking; 2 = marking was partially removed or was smeared and was still readable; 3 = most of the marking was removed, but a faint remnant or “ghost” of the mark was visible; 4 = the marking was completely removed.

#### Wet Erase Test

After the films were evaluated in the dry erase test, the same films were subjected to a wet cleaning test protocol after which they were again evaluated for erasability. Specifically, the films were sprayed with water and were then wiped by hand with a paper towel, using moderate pressure, in ten back and forth motions. The films were then sprayed with a glass cleaner available under the trade designation “WINDEX ORIGINAL GLASS CLEANER” from SC Johnson Company, Racine, Wisconsin, and were again wiped by hand with a paper towel, using moderate pressure, in ten back and forth motions. The films were then sprayed with liquid cleaner obtained under the trade designation “EXPO WHITE BOARD CLEANER” from Sanford Corporation, and were again wiped by hand with a paper towel, using moderate pressure, in ten back and forth motions. The erasability of the films after the sequence of three wet cleaning steps was evaluated as described for the dry erase test and the data are reported in Table 2.

#### General Method for Preparation of Erasable Films

Erasable films were prepared by coating individual samples of Polymer Films A (after removal of the liner) and B with Precursor Compositions HC1 through HC5, and then curing the precursor composition with electromagnetic radiation. Accordingly, the polymer film was temporarily fastened to a glass plate by taping the corners of the polymer film to the plate with adhesive tape. The hardcoat precursor composition was then coated on the polymer film by means of a #6 Meyer rod (obtained from RD Specialties, Webster, New York) resulting in a nominal wet coating thickness of 15 micrometers. The solvent was then allowed to evaporate at room temperature for approximately one minute. The coated precursor composition was then exposed to high intensity ultraviolet light from a 600 watts/inch (236 watts/cm) microwave driven lamp equipped with a H-type bulb (obtained from Fusion UV Systems, Inc., Gaithersburg,

Maryland) by passing the coated film under the lamp at a speed of 100 feet per minute (30 m/min, Dosage: UVA 0.166 J/cm<sup>2</sup>, UVB 0.164 J/cm<sup>2</sup>) under a blanket of nitrogen gas.

The resultant coated and cured films were (with any associated liner removed) were DC corona charged under ambient conditions using a horizontally arranged series of four charging bars (obtained under the trade designation "CHARGEMASTER PINNER ARC RESISTANT CHARGING BAR" from Simco Company, Hatfield, Pennsylvania). The charging bars were spaced as follows: the center to center distance between bar 1 and bar 2 was 3.0 inches (7.6 cm), the center to center distance between bar 2 and bar 3 was 3.25 inches (8.3 cm), and the center to center distance between bar 3 and bar 4 was 3.75 inches (9.5 cm). Each charging bar was situated 1.5 inches (3.5 cm) above a corresponding grounded metal plate. A voltage of +29 kilovolts (relative to the grounded metal plates) was applied to each charging bar. Film samples were charged by placing them on a moving (one foot per minute (1.8 meters per minute)) continuous belt (part number: 8882802A, obtained from Light Weight Belting Corporation, Minneapolis, Minnesota) that passed between the charging bars and the metal plates, such that the belt maintained contact with the metal plates. During charging, the coated side of the film faced the belt.

#### Preparation of Comparative Films

Comparative films were prepared by corona charging individual samples of Polymer Films A and B according to the General Method for Preparation of Erasable Films (above), except that no precursor composition used. Identification of comparative and dry erase films is given in Table 1 (below).

TABLE 1

| FILM IDENTIFICATION | POLYMER FILM | CROSSLINKED POLYMERIC COATING |
|---------------------|--------------|-------------------------------|
| CA (Comparative)    | A            | None                          |
| CB (Comparative)    | B            | None                          |
| F1                  | A            | HC1                           |
| F2                  | A            | HC2                           |

| FILM<br>IDENTIFICATION | POLYMER FILM | CROSSLINKED<br>POLYMERIC COATING |
|------------------------|--------------|----------------------------------|
| F3                     | A            | HC3                              |
| F4                     | A            | HC4                              |
| F5                     | A            | HC5                              |
| F6                     | B            | HC2                              |
| F7                     | B            | HC3                              |
| F8                     | B            | HC4                              |
| F9                     | B            | HC5                              |

Evaluation of Films for Erasability

The films of Table 1 were evaluated for erasability using the Dry Erase Test and the Wet Erase Test. Results are presented in Table 2 (below).

TABLE 2

| TEST NUMBER | FILM | MARKERS | DRY ERASE RATING AFTER 24 HOURS AT 23 °C | DRY ERASE RATING AFTER 72 HOURS AT 49 °C | WET ERASE RATING AFTER 24 HOURS AT 23 °C | WET ERASE RATING AFTER 72 HOURS AT 49 °C |
|-------------|------|---------|------------------------------------------|------------------------------------------|------------------------------------------|------------------------------------------|
| 1           | CA   | A1, A1' | 1                                        | Not tested                               | 4                                        | Not tested                               |
| 2           | CB   | A1, A1' | 4                                        | 1                                        | 4                                        | 4                                        |
| 3           | F1   | A1, A1' | 4                                        | 1                                        | 4                                        | 4                                        |
| 4           | F2   | A1, A1' | 4                                        | 4                                        | 4                                        | 4                                        |
| 5           | F3   | A1, A1' | 4                                        | 1                                        | 4                                        | 4                                        |
| 6           | F4   | A1, A1' | 3                                        | 1                                        | 4                                        | 4                                        |
| 7           | F5   | A1, A1' | 3                                        | 1                                        | 4                                        | 4                                        |
| 8           | F6   | A1, A1' | 4                                        | 4                                        | 4                                        | 4                                        |
| 9           | F7   | A1, A1' | 4                                        | 4                                        | 4                                        | 4                                        |
| 10          | F8   | A1, A1' | 4                                        | 4                                        | 4                                        | 4                                        |
| 11          | F9   | A1, A1' | 4                                        | 4                                        | 4                                        | 4                                        |
| 12          | CA   | B1, B1' | 1                                        | Not tested                               | 3                                        | Not tested                               |
| 13          | CB   | B1, B1' | 4                                        | 1                                        | 4                                        | 4                                        |
| 14          | F1   | B1, B1' | 4                                        | 1                                        | 4                                        | 4                                        |
| 15          | F2   | B1, B1' | 4                                        | 3                                        | 4                                        | 4                                        |
| 16          | F3   | B1, B1' | 4                                        | 1                                        | 4                                        | 4                                        |
| 17          | F4   | B1, B1' | 3                                        | 1                                        | 4                                        | 4                                        |
| 18          | F5   | B1, B1' | 3                                        | 1                                        | 4                                        | 4                                        |
| 19          | F6   | B1, B1' | 4                                        | 4                                        | 4                                        | 4                                        |
| 20          | F7   | B1, B1' | 4                                        | 4                                        | 4                                        | 4                                        |
| 21          | F8   | B1, B1' | 4                                        | 4                                        | 4                                        | 4                                        |
| 22          | F9   | B1, B1' | 4                                        | 4                                        | 4                                        | 4                                        |

| TEST NUMBER | FILM | MARKERS | DRY ERASE RATING AFTER 24 HOURS AT 23 °C | DRY ERASE RATING AFTER 72 HOURS AT 49 °C | WET ERASE RATING AFTER 24 HOURS AT 23 °C | WET ERASE RATING AFTER 72 HOURS AT 49 °C |
|-------------|------|---------|------------------------------------------|------------------------------------------|------------------------------------------|------------------------------------------|
| 23          | CA   | B2, B2' | 1                                        | Not tested                               | 3                                        | Not tested                               |
| 24          | CB   | B2, B2' | 4                                        | 2                                        | 4                                        | 4                                        |
| 25          | F1   | B2, B2' | 4                                        | 2                                        | 4                                        | 4                                        |
| 26          | F2   | B2, B2' | 4                                        | 3                                        | 4                                        | 4                                        |
| 27          | F3   | B2, B2' | 3                                        | 2                                        | 4                                        | 4                                        |
| 28          | F4   | B2, B2' | 3                                        | 2                                        | 4                                        | 4                                        |
| 29          | F5   | B2, B2' | 3                                        | 1                                        | 4                                        | 4                                        |
| 30          | F6   | B2, B2' | 4                                        | 4                                        | 4                                        | 4                                        |
| 31          | F7   | B2, B2' | 4                                        | 4                                        | 4                                        | 4                                        |
| 32          | F8   | B2, B2' | 4                                        | 4                                        | 4                                        | 4                                        |
| 33          | F9   | B2, B2' | 4                                        | 4                                        | 4                                        | 4                                        |
| 34          | CA   | D1, D1' | 1                                        | Not tested                               | 3                                        | Not tested                               |
| 35          | CB   | D1, D1' | 4                                        | 3                                        | 4                                        | 4                                        |
| 36          | F1   | D1, D1' | 4                                        | 1                                        | 4                                        | 4                                        |
| 37          | F2   | D1, D1' | 4                                        | 3                                        | 4                                        | 4                                        |
| 38          | F3   | D1, D1' | 3                                        | 2                                        | 4                                        | 4                                        |
| 39          | F4   | D1, D1' | 3                                        | 2                                        | 4                                        | 4                                        |
| 40          | F5   | D1, D1' | 3                                        | 1                                        | 4                                        | 4                                        |
| 41          | F6   | D1, D1' | 4                                        | 4                                        | 4                                        | 4                                        |
| 42          | F7   | D1, D1' | 4                                        | 4                                        | 4                                        | 4                                        |
| 43          | F8   | D1, D1' | 4                                        | 4                                        | 4                                        | 4                                        |
| 44          | F9   | D1, D1' | 4                                        | 4                                        | 4                                        | 4                                        |
| 45          | CA   | E3, E3' | 2                                        | Not tested                               | 3                                        | Not tested                               |
| 46          | CB   | E3, E3' | 4                                        | 3                                        | 4                                        | 3.5                                      |
| 47          | F1   | E3, E3' | 4                                        | 2.5                                      | 4                                        | 4                                        |
| 48          | F2   | E3, E3' | 4                                        | 4                                        | 4                                        | 4                                        |
| 49          | F3   | E3, E3' | 3                                        | 2                                        | 3.5                                      | 4                                        |

| TEST NUMBER | FILM | MARKERS | DRY ERASE RATING AFTER 24 HOURS AT 23 °C | DRY ERASE RATING AFTER 72 HOURS AT 49 °C | WET ERASE RATING AFTER 24 HOURS AT 23 °C | WET ERASE RATING AFTER 72 HOURS AT 49 °C |
|-------------|------|---------|------------------------------------------|------------------------------------------|------------------------------------------|------------------------------------------|
| 50          | F4   | E3, E3' | 4                                        | 3                                        | 4                                        | 4                                        |
| 51          | F5   | E3, E3' | 3                                        | 2.5                                      | 4                                        | 4                                        |
| 52          | F6   | E3, E3' | 4                                        | 4                                        | 4                                        | 4                                        |
| 53          | F7   | E3, E3' | 4                                        | 4                                        | 4                                        | 4                                        |
| 54          | F8   | E3, E3' | 4                                        | 4                                        | 4                                        | 4                                        |
| 55          | F9   | E3, E3' | 4                                        | 4                                        | 4                                        | 4                                        |
| 56          | CA   | E2, E2' | 1                                        | Not tested                               | 3                                        | Not tested                               |
| 57          | CB   | E2, E2' | 4                                        | 3                                        | 4                                        | 4                                        |
| 58          | F1   | E2, E2' | 4                                        | 3                                        | 4                                        | 4                                        |
| 59          | F2   | E2, E2' | 4                                        | 4                                        | 4                                        | 4                                        |
| 60          | F3   | E2, E2' | 3.5                                      | 3                                        | 4                                        | 4                                        |
| 61          | F4   | E2, E2' | 3                                        | 3                                        | 4                                        | 4                                        |
| 62          | F5   | E2, E2' | 3                                        | 2.5                                      | 4                                        | 4                                        |
| 63          | F6   | E2, E2' | 4                                        | 4                                        | 4                                        | 4                                        |
| 64          | F7   | E2, E2' | 4                                        | 4                                        | 4                                        | 4                                        |
| 65          | F8   | E2, E2' | 4                                        | 4                                        | 4                                        | 4                                        |
| 66          | F9   | E2, E2' | 4                                        | 4                                        | 4                                        | 4                                        |
| 67          | CA   | E1, E1' | 1                                        | Not tested                               | 3.5                                      | Not tested                               |
| 68          | CB   | E1, E1' | 4                                        | 3.5                                      | 4                                        | 4                                        |
| 69          | F1   | E1, E1' | 4                                        | 2                                        | 4                                        | 4                                        |
| 70          | F2   | E1, E1' | 4                                        | 2.5                                      | 4                                        | 4                                        |
| 71          | F3   | E1, E1' | 3                                        | 2.5                                      | 4                                        | 4                                        |
| 72          | F4   | E1, E1' | 3                                        | 2.5                                      | 4                                        | 4                                        |
| 73          | F5   | E1, E1' | 3                                        | 3                                        | 4                                        | 4                                        |
| 74          | F6   | E1, E1' | 4                                        | 3                                        | 4                                        | 4                                        |
| 75          | F7   | E1, E1' | 4                                        | 3                                        | 4                                        | 4                                        |
| 76          | F8   | E1, E1' | 4                                        | 3                                        | 4                                        | 4                                        |

| TEST<br>NUMBER | FILM | MARKERS | DRY ERASE<br>RATING<br>AFTER 24 HOURS<br>AT 23 °C | DRY ERASE<br>RATING<br>AFTER 72 HOURS<br>AT 49 °C | WET ERASE<br>RATING<br>AFTER 24 HOURS<br>AT 23 °C | WET ERASE<br>RATING<br>AFTER 72<br>HOURS AT 49 °C |
|----------------|------|---------|---------------------------------------------------|---------------------------------------------------|---------------------------------------------------|---------------------------------------------------|
| 77             | F9   | E1, E1' | 4                                                 | 3                                                 | 4                                                 | 4                                                 |
| 78             | CA   | A2, A2' | 1                                                 | Not tested                                        | 4                                                 | Not tested                                        |
| 79             | CB   | A2, A2' | 1                                                 | 1                                                 | 4                                                 | 3.5                                               |
| 80             | F1   | A2, A2' | 1                                                 | 1                                                 | 4                                                 | 4                                                 |
| 81             | F2   | A2, A2' | 1                                                 | 1                                                 | 4                                                 | 4                                                 |
| 82             | F3   | A2, A2' | 1                                                 | 1                                                 | 3.5                                               | 3.5                                               |
| 83             | F4   | A2, A2' | 1                                                 | 1                                                 | 4                                                 | 4                                                 |
| 84             | F5   | A2, A2' | 1                                                 | 1                                                 | 4                                                 | 4                                                 |
| 85             | F6   | A2, A2' | 1                                                 | 1                                                 | 4                                                 | 4                                                 |
| 86             | F7   | A2, A2' | 1                                                 | 1                                                 | 4                                                 | 4                                                 |
| 87             | F8   | A2, A2' | 1                                                 | 1                                                 | 4                                                 | 4                                                 |
| 88             | F9   | A2, A2' | 1                                                 | 1                                                 | 4                                                 | 4                                                 |
| 89             | CA   | S1, S1' | 1                                                 | Not tested                                        | 3                                                 | Not tested                                        |
| 90             | CB   | S1, S1' | 1                                                 | 1                                                 | 4                                                 | 3.5                                               |
| 91             | F1   | S1, S1' | 1                                                 | 1                                                 | 4                                                 | 4                                                 |
| 92             | F2   | S1, S1' | 1                                                 | 1                                                 | 4                                                 | 4                                                 |
| 93             | F3   | S1, S1' | 1                                                 | 1                                                 | 3.5                                               | 3.5                                               |
| 94             | F4   | S1, S1' | 1                                                 | 1                                                 | 4                                                 | 4                                                 |
| 95             | F5   | S1, S1' | 1                                                 | 1                                                 | 4                                                 | 4                                                 |
| 96             | F6   | S1, S1' | 1                                                 | 1                                                 | 4                                                 | 4                                                 |
| 97             | F7   | S1, S1' | 1                                                 | 1                                                 | 4                                                 | 4                                                 |
| 98             | F8   | S1, S1' | 1                                                 | 1                                                 | 4                                                 | 4                                                 |
| 99             | F9   | S1, S1' | 1                                                 | 1                                                 | 4                                                 | 4                                                 |

Various modifications and alterations of this invention will become apparent to those skilled in the art without departing from the scope and spirit of this invention, and it should be understood that this invention is not to be unduly limited to the illustrated embodiments set forth herein.

What is claimed is:

1. A method of making an erasable article comprising:  
providing an electret film having first and second opposed major surfaces;  
5 applying a polymerizable precursor composition to at least a portion of the first major surface;  
polymerizing the polymerizable precursor composition to form a non-tacky crosslinked polymeric layer; and  
10 exposing the electret film and non-tacky crosslinked polymeric layer to a direct current corona discharge,  
wherein the second major surface is free of adhesive material.
2. An erasable article comprising an electret film having first and second opposed major surfaces, and a non-tacky crosslinked polymeric layer contacting the first major  
15 surface, wherein the non-tacky crosslinked polymeric layer comprises colloidal silica, and wherein the second major surface is free of adhesive material.
3. The method of claim 1 or the article of claim 2, wherein the non-tacky crosslinked polymeric layer has a thickness in a range of from 0.5 micrometers to 20 micrometers.  
20
4. The method of claim 1 or the article of claim 2, wherein the non-tacky crosslinked polymeric layer has a thickness in a range of from 3 micrometers to 8 micrometers.
5. The method of claim 1 or the article of claim 2, wherein the non-tacky crosslinked  
25 polymeric layer has a scratch hardness of at least 4H.
6. The method of claim 1 or the article of claim 2, wherein the non-tacky crosslinked polymeric layer has a scratch hardness of at least 6H.
- 30 7. The method of claim 1 or the article of claim 2, wherein the non-tacky crosslinked polymeric layer has a roughness Ra of less than 50 nanometers.

8. The method of claim 1 or the article of claim 2, wherein the non-tacky crosslinked polymeric layer has a roughness Ra of less than 5 nanometers.
9. The method of claim 1, wherein polymerizable precursor composition comprises polymerizable material and curative.
10. The method of claim 9, wherein the polymerizable material comprises polyacrylate.
11. The method of claim 9 or claim 10, wherein the curative comprises photoinitiator.
12. The method of claim 1 or the article of claim 2, wherein the electret film is opaque.
13. The method of claim 1 or the article of claim 2, wherein the electret film is transparent or translucent.
14. The method of claim 1 or the article of claim 2, wherein the electret film comprises at least one of polypropylene or a poly(ethylene-co-methacrylic acid) ionomer.
15. The method of claim 1 or the article of claim 2, wherein the electret film further comprises phosphorescent pigment.
16. The article of claim 2, further comprising an ink layer disposed between the non-tacky crosslinked polymeric layer and the electret film.
17. The article of claim 16, wherein the ink layer further comprises phosphorescent pigment.
18. A stack comprising a plurality of erasable articles according to claim 2 superimposed on each other.

19. The article of claim 2, further comprising a liner, wherein the liner contacts the second major surface.

20. A kit comprising:

5 an erasable article according to claim 2 or claim 19; and  
at least one of a marker, eraser, or liquid cleaner.

21. The kit of claim 20, wherein the marker comprises an aqueous ink.

10

1/1

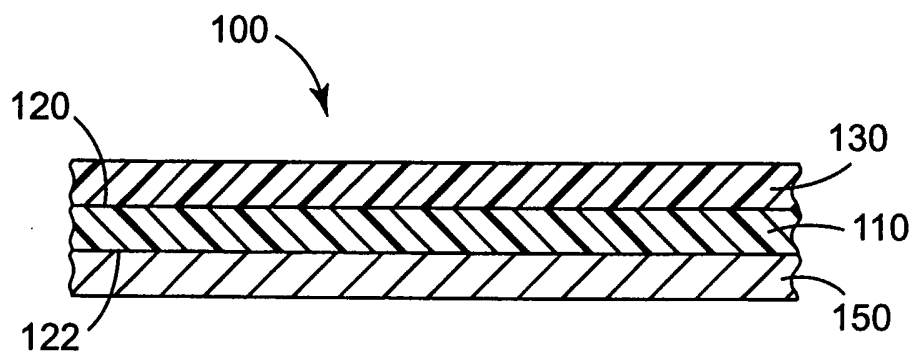


FIG. 1

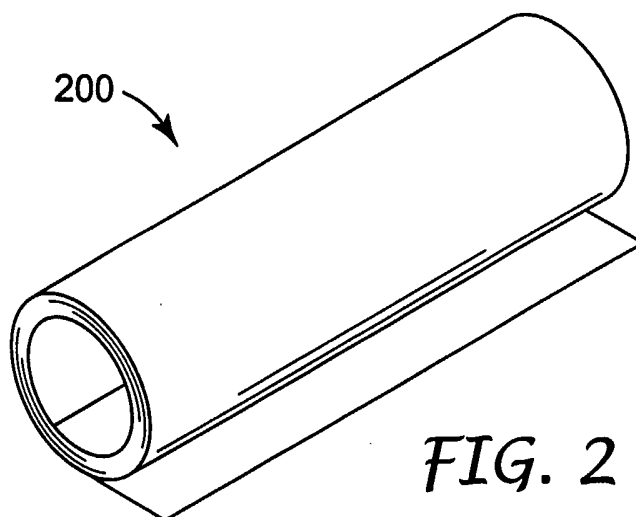


FIG. 2

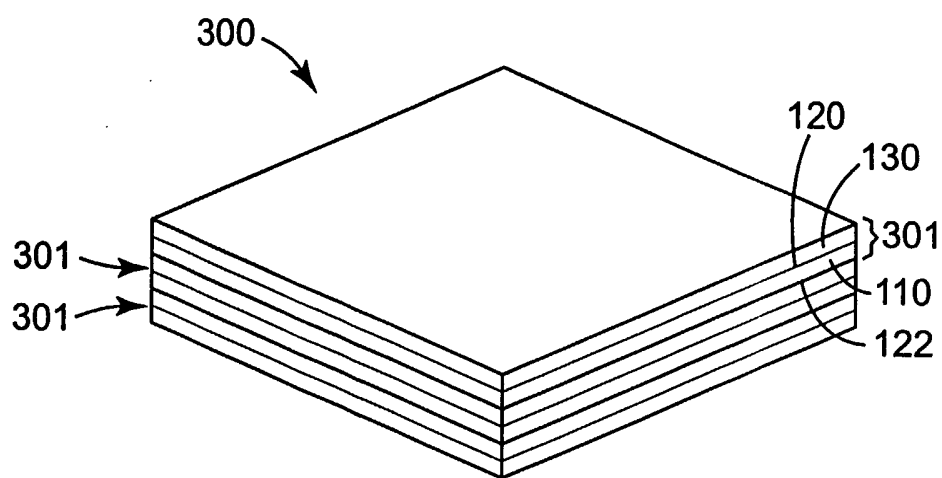


FIG. 3