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(54) Title: OPTICAL COMPENSATION FILMS BASED ON FLUOROPOLYMERS

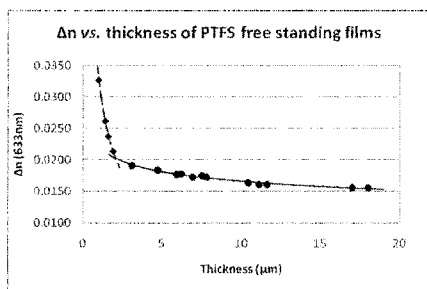
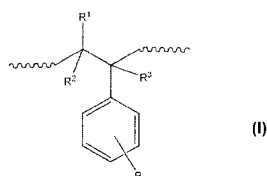


Figure 1 Birefringence of PTFS film vs. film thickness (blade casting from toluene solution)

(57) Abstract: An optical compensation film composition is disclosed herein having a polymer film and a substrate, wherein the polymer film has a positive birefringence greater than 0.005 throughout the wavelength range of 400 nm < λ < 800 nm, the film having been cast from a polymer solution comprising a solvent and a polymer having a moiety of (I) wherein R¹, R² and R³ are each independently hydrogen atoms, alkyl groups, substituted alkyl groups, or halogens, wherein at least one of R¹, R² and R³ is a fluorine atom, and wherein R is hydrogen or a substituent on the styrenic ring.





MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK,
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According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

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

Korean utility models and applications for utility models

Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal) & Keywords: fluoropolymer, optical compensation film, wavelength, solvent

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2009-0068380 A1 (ZHENG XIAOLIANG JOE et al.) 12 March 2009 See the whole document.	1-26
A	US 05985942A A (STECK; ALFRED E. et al.) 16 November 1999 See the whole document.	1-26
A	US 05177149A A (ANGELI; STEPHEN R. et al.) 05 January 1993 See the whole document.	1-26
A	US 2007-0177087 A1 (SATORU KAWAHARA et al.) 02 August 2007 See the whole document.	1-26
A	US 05189538A A (ARAKAWA; KOHEI) 23 February 1993 See the whole document.	1-26
A	US 2005-0270458 A1 (TOMOHIRO ISHIKAWA et al.) 08 December 2005 See the whole document.	1-26

 Further documents are listed in the continuation of Box C. See patent family annex.

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Information on patent family members

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date		
US 2009-0068380 A1	12.03.2009	CN 101765805 A	30.06.2010		
		CN 102197331 A	21.09.2011		
		EP 2135133 A2	23.12.2009		
		EP 2340461 A2	06.07.2011		
		JP 2010-522900 A	08.07.2010		
		KR 10-2010-0015906 A	12.02.2010		
		KR 10-2011-0055562 A	25.05.2011		
		TW 200900814 A	01.01.2009		
		TW 201022337 A	16.06.2010		
		US 2008-0239491 A1	02.10.2008		
		US 2011-0076487 A1	31.03.2011		
		WO 2008-121580 A2	09.10.2008		
		WO 2008-121580 A3	09.10.2008		
		WO 2010-053500 A2	14.05.2010		
		WO 2010-053500 A3	01.07.2010		
		WO 2010-053500 A3	14.05.2010		
		US 05985942A A	16.11.1999	AU 1996-58893 B2	26.08.1999
				AU 1997-11872 B2	06.05.1999
CA 2221813 A1	12.12.1996				
CA 2221813 C	29.04.2003				
CA 2240495 A1	17.07.1997				
CA 2240495 C	01.04.2003				
EP 0720628 A1	19.01.2000				
EP 0720628 B1	09.08.2000				
EP 0848702 A1	30.06.1999				
EP 0848702 B1	13.09.2000				
EP 0882088 A1	29.12.1999				
EP 0882088 B1	05.07.2000				
JP 03-061197 B2	28.04.2000				
JP 08-512358 A	24.12.1996				
JP 11-506149 A	02.06.1999				
JP 2000-138068 A	16.05.2000				
JP 2000-502625 A	07.03.2000				
US 05422411A A	06.06.1995				
US 05498639A A	12.03.1996				
US 05602185A A	11.02.1997				
US 05684192A A	04.11.1997				
US 05773480A A	30.06.1998				
US 05834523A A	10.11.1998				
US 2001-0056128 A1	27.12.2001				
US 2002-0161061 A1	31.10.2002				
US 6258861 B1	10.07.2001				
US 6437011 B2	20.08.2002				
WO 95-08581 A1	30.03.1995				
WO 96-39379 A1	12.12.1996				
WO 97-25369 A1	17.07.1997				
US 05177149A A	05.01.1993	EP 0370243 A2	30.05.1990		

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2011/052614

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
		EP 0370243 A3	03.07.1991
		JP 02-191663 A	27.07.1990
US 2007-0177087 A1	02.08.2007	CN 1731227 A	08.02.2006
		CN 1731227 C0	15.10.2008
		JP 03-841306 B2	01.11.2006
		JP 2006-072309 A	16.03.2006
		JP 2006-268065 A	05.10.2006
		KR 10-0975252 B1	11.08.2010
		US 2006-0028601 A1	09.02.2006
		US 2006-0257078 A1	16.11.2006
		US 7215839 B2	08.05.2007
		US 7336857 B2	26.02.2008
		US 7391935 B2	24.06.2008
US 05189538A A	23.02.1993	EP 0367288 A2	09.05.1990
		EP 0367288 A3	02.05.1991
		EP 0367288 B1	23.08.1995
		JP 02-256023 A	16.10.1990
		JP 02-857889 B2	04.12.1998
		JP 2857889 B2	17.02.1999
US 2005-0270458 A1	08.12.2005	CN 100538476 C	09.09.2009
		CN 1973242 A	30.05.2007
		JP 2008-502006 A	24.01.2008
		JP 2008-502006 T	24.01.2008
		KR 10-2007-0032672 A	22.03.2007
		US 7236221 B2	26.06.2007
		WO 2005-121880 A1	22.12.2005