US009411076B2

(12) **United States Patent**
Slezak et al.

(10) **Patent No.: US 9,411,076 B2**
(45) **Date of Patent: Aug. 9, 2016**

(54) **PIGMENTED POLYMERIZABLE COMPOSITIONS AND OPTICAL ARTICLES PREPARED THEREFROM**

(71) Applicant: **PPG INDUSTRIES OHIO, INC.**, Cleveland, OH (US)

(72) Inventors: **Brandy D. Slezak**, Export, PA (US); **Royann L. Stewart-Davis**, Springdale, PA (US); **Robert D. Herold**, Monroeville, PA (US); **Mark P. Bowman**, New Kensington, PA (US); **Joseph S. Szul**, Canfield, OH (US)

(73) Assignee: **PPG Industries Ohio, Inc.**, Cleveland, OH (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 72 days.

(21) Appl. No.: **14/025,300**

(22) Filed: **Sep. 12, 2013**

(65) **Prior Publication Data**

US 2014/0080972 A1 Mar. 20, 2014

Related U.S. Application Data

(60) Provisional application No. 61/700,934, filed on Sep. 14, 2012.

(51) **Int. Cl.**
G02B 1/04 (2006.01)

(52) **U.S. Cl.**
CPC ***G02B 1/04*** (2013.01)

(58) **Field of Classification Search**
CPC G02B 1/04
USPC 524/780, 700
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,750,593	A	5/1998	Castegnier et al.	
5,830,578	A	11/1998	Ono et al.	
5,949,518	A	9/1999	Belmares et al.	
6,027,816	A	2/2000	Ono et al.	
6,770,705	B2 *	8/2004	Vanier et al.	524/560
6,852,780	B2	2/2005	Fujita et al.	
7,261,845	B2	8/2007	Itoh et al.	
8,106,108	B2	1/2012	Chen	
8,129,466	B2	3/2012	Polk et al.	
8,173,739	B2	5/2012	Smetana	
2003/0162876	A1	8/2003	Vanier et al.	
2005/0134795	A1	6/2005	Lally et al.	
2012/0187351	A1 *	7/2012	Ito et al.	252/586
2012/0200925	A1	8/2012	Iwasa et al.	

FOREIGN PATENT DOCUMENTS

CN	1958643	A	5/2007
CN	101359103	A	2/2009
EP	1271186	A1	1/2003
EP	1331494	A1	7/2003
JP	05-194616	A	8/1993
JP	05-195446	A	8/1993
JP	2003105227	A	4/2003
WO	WO 99/26087	A1	5/1999
WO	WO 02/41042	A1	5/2002

* cited by examiner

Primary Examiner — Kelechi Egwim

(74) *Attorney, Agent, or Firm* — The Webb Law Firm

(57) **ABSTRACT**

Provided is a polymerizable composition including: (a) a polymerizable component; and (b) a pigment component the pigment component includes: (i) an ionic or amphoteric dispersant material; and (ii) pigment nanoparticles uniformly dispersed in the dispersant material (i). The nanoparticles have a particle size of up to 500 nanometers. Also provided is a polymerizable composition of: (a) a polymerizable component including: (i) diethylene glycol bis(allyl carbonate); and (ii) a radical initiator; and (b) a pigment component which includes: (i) an ionic or amphoteric dispersant material derived from polycaprolactone; and (ii) pigment nanoparticles of ultramarine blue having an average particle size of up to 500 nanometers, uniformly dispersed in the dispersant material.

19 Claims, No Drawings