



US008765851B2

(12) **United States Patent**
Miller et al.(10) **Patent No.:** US 8,765,851 B2
(45) **Date of Patent:** Jul. 1, 2014(54) **FREE RADICAL INITIATOR MODIFIED HOT MELT ADHESIVE COMPOSITION INCLUDING FUNCTIONALIZED POLYETHYLENE AND PROPYLENE-ALPHA-OLEFIN POLYMER**(75) Inventors: **Richard A. Miller**, White Bear Lake, MN (US); **Kevin Davis**, North St. Paul, MN (US); **Stephen M. Willging**, Minneapolis, MN (US); **Sharf U. Ahmed**, Woodbury, MN (US); **Timothy W. Roska**, Forest Lake, MN (US)(73) Assignee: **H.B. Fuller Company**, St. Paul, MN (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 168 days.

(21) Appl. No.: **13/529,269**(22) Filed: **Jun. 21, 2012**(65) **Prior Publication Data**

US 2012/0329929 A1 Dec. 27, 2012

Related U.S. Application Data

(60) Provisional application No. 61/501,585, filed on Jun. 27, 2011.

(51) **Int. Cl.**
C09J 123/30 (2006.01)
C09J 123/14 (2006.01)
C09J 151/06 (2006.01)(52) **U.S. Cl.**
CPC *C09J 123/14* (2013.01); *C09J 151/06* (2013.01)
USPC **524/275**(58) **Field of Classification Search**
CPC C09J 123/14; C09J 151/06
USPC 524/275
See application file for complete search history.(56) **References Cited**

U.S. PATENT DOCUMENTS

3,539,481 A 11/1970 Parker
3,862,265 A 1/1975 Steinkamp et al.
3,882,194 A 5/1975 Krebaum et al.
3,987,122 A 10/1976 Bartz et al.
4,105,718 A 8/1978 Hall
4,112,208 A 9/1978 McConnell et al.
4,120,916 A 10/1978 Meyer, Jr. et al.
4,140,733 A 2/1979 Meyer et al.
4,217,428 A 8/1980 McConnell et al.
4,477,532 A 10/1984 Schmukler et al.
4,506,056 A 3/1985 Gaylord
4,567,223 A 1/1986 Ames
4,906,690 A 3/1990 Hasenbein et al.
5,041,482 A 8/1991 Ornsteen et al.
5,041,484 A 8/1991 Atwell et al.
5,185,398 A 2/1993 Kehr et al.
5,241,014 A 8/1993 Kehr et al.
5,302,675 A 4/1994 Sustic et al.5,441,999 A 8/1995 Jarvis et al.
5,455,111 A 10/1995 Velasquez Urey
5,468,807 A 11/1995 Tsurutani et al.
5,534,575 A 7/1996 Foster et al.
5,637,410 A 6/1997 Bonner et al.
5,723,546 A 3/1998 Sustic et al.
5,783,629 A 7/1998 Srinivasan et al.
5,955,547 A 9/1999 Roberts et al.
5,986,009 A 11/1999 Thoen et al.
6,080,818 A 6/2000 Thakker et al.
6,100,351 A 8/2000 Sun et al.
6,107,430 A 8/2000 Dubois et al.
6,143,825 A 11/2000 Beren et al.
6,184,327 B1 2/2001 Weng et al.
6,248,832 B1 6/2001 Peacock
6,395,791 B1 5/2002 Chaudhary et al.
6,448,333 B1 9/2002 Rodriguez et al.
6,475,633 B1 11/2002 Robert et al.
6,552,110 B1 4/2003 Yalvac et al.
6,573,350 B1 6/2003 Markel et al.
6,653,385 B2 11/2003 Wang et al.
6,656,601 B1 12/2003 Kawachi et al.
6,747,114 B2 6/2004 Karandinos et al.
6,797,774 B2 9/2004 Kijima
6,872,279 B1 3/2005 Kolowrot et al.
6,936,635 B1 8/2005 Da Silva
6,960,635 B2 11/2005 Stevens et al.
7,067,585 B2 6/2006 Wang et al.
7,223,814 B2 5/2007 Martin et al.

(Continued)

FOREIGN PATENT DOCUMENTS

DE 102008019802 A1 10/2009
EP 0 442 045 B1 10/1993

(Continued)

OTHER PUBLICATIONS

Rextac MSDS RT2765 CS212 (Feb. 14, 2011) (4 pages).
Rextac Product Specifications, <http://www.rextac.com/index.pbp?q=node/21>, (2 pages).
Rextac RT2115 product data sheet (Apr. 1998) (1 page).
Rextac RT2730 product data sheet (Apr. 1998) (1 page).

(Continued)

Primary Examiner — Doris Lee(74) *Attorney, Agent, or Firm* — Kirsten Stone; Allison Johnson(57) **ABSTRACT**

A hot melt adhesive composition that includes a first copolymer that includes the reaction product of a functionalized polyethylene, a propylene-alpha-olefin polymer that includes at least 50 mole % propylene and has a viscosity of no greater than 10,000 centipoise at 190° C., a ratio of z average molecular weight (Mz) to number average molecular weight (Mn) (Mz/Mn) of greater than 20, and a ratio of Mz to weight average molecular weight (Mw) (Mz/Mw) of greater than 3.0, and a free radical initiator.

42 Claims, No Drawings