



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

(10) **Patent No.:** **US 9,410,004 B2**
(45) **Date of Patent:** **Aug. 9, 2016**

(54) **AROMATIC POLYETHERSULFONE
MICROPARTICLES HAVING NARROW
PARTICLE DIAMETER DISTRIBUTION
INDEX**

(58) **Field of Classification Search**
CPC C08G 75/23; C08J 2381/06; C08L 81/06;
C08L 55/02
USPC 428/402-407
See application file for complete search history.

(71) Applicant: **Toray Industries, Inc.**, Tokyo (JP)
(72) Inventors: **Itaru Asano**, Nagoya (JP); **Yuji Echigo**,
Nagoya (JP); **Hiroshi Takezaki**, Nagoya
(JP)

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,166,800 A 9/1979 Fong
4,321,174 A * 3/1982 Hoy et al. 523/101
(Continued)

(73) Assignee: **Toray Industries, Inc.** (JP)
(*) Notice: Subject to any disclaimer, the term of this
patent is extended or adjusted under 35
U.S.C. 154(b) by 0 days.

FOREIGN PATENT DOCUMENTS

CA 1122077 4/1982
CN 1469753 A 1/2004
(Continued)

(21) Appl. No.: **13/962,653**

(22) Filed: **Aug. 8, 2013**

(65) **Prior Publication Data**
US 2013/0337263 A1 Dec. 19, 2013

Related U.S. Application Data

(62) Division of application No. 12/993,502, filed as
application No. PCT/JP2009/059254 on May 20,
2009, now Pat. No. 8,574,669.

OTHER PUBLICATIONS

A. Tuncel et al., "Electron Microscopic Observation of Uniform
Macroporous Particles. I. Effect of Seed Latex Type and Diluent,"
Journal of Applied Polymer Science, vol. 71, 1999, pp. 2271-2290.
(Continued)

(30) **Foreign Application Priority Data**

May 21, 2008 (JP) 2008-132939
May 21, 2008 (JP) 2008-132940
Feb. 10, 2009 (JP) 2009-029175

Primary Examiner — Holly Le
(74) *Attorney, Agent, or Firm* — DLA Piper LLP (US)

(57) **ABSTRACT**

(51) **Int. Cl.**
B32B 5/16 (2006.01)
C08F 120/44 (2006.01)
(Continued)

A fine polymer particle production method includes produc-
ing an emulsion in a liquid prepared by dissolving and mixing
a polymer A and a polymer B in organic solvents in which a
solution phase composed primarily of the polymer A and a
solution phase composed primarily of the polymer B are
formed as separate phases, and bringing it into contact with a
poor solvent for the polymer A to precipitate the polymer A.
This method serves for easy synthesis of fine polymer par-
ticles with a narrow particle size distribution and the method
can be effectively applied to production of highly heat-resis-
tant polymers that have been difficult to produce with the
conventional methods.

(52) **U.S. Cl.**
CPC **C08F 120/44** (2013.01); **C08G 64/40**
(2013.01); **C08G 65/46** (2013.01); **C08G 69/46**
(2013.01);
(Continued)

1 Claim, 3 Drawing Sheets

