



US012466934B2

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

(10) **Patent No.: US 12,466,934 B2**
(45) **Date of Patent: *Nov. 11, 2025**

(54) **METHOD FOR RECYCLING POLYESTER FABRICS WITH USE OF IONIC LIQUID CATALYST**

(71) Applicant: **NAN YA PLASTICS CORPORATION, Taipei (TW)**

(72) Inventors: **Te-Chao Liao, Taipei (TW); Jung-Jen Chuang, Taipei (TW); Wei-Sheng Cheng, Taipei (TW); Zhang-Jian Huang, Taipei (TW); Yu-Ti Tseng, Taipei (TW)**

(73) Assignee: **NAN YA PLASTICS CORPORATION, Taipei (TW)**

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 724 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **17/849,691**

(22) Filed: **Jun. 26, 2022**

(65) **Prior Publication Data**

US 2023/0062055 A1 Mar. 2, 2023

(30) **Foreign Application Priority Data**

Aug. 26, 2021 (TW) 110131554

(51) **Int. Cl.**

C08J 11/28 (2006.01)
B01D 15/16 (2006.01)
B01D 15/36 (2006.01)
B01D 17/02 (2006.01)
B01J 31/02 (2006.01)
B09B 3/70 (2022.01)
B29B 17/00 (2006.01)
B09B 101/75 (2022.01)
B09B 101/85 (2022.01)
B29K 67/00 (2006.01)

(52) **U.S. Cl.**

CPC **C08J 11/28** (2013.01); **B01D 15/161** (2013.01); **B01D 15/361** (2013.01); **B01D 17/0208** (2013.01); **B01J 31/0284** (2013.01); **B01J 31/0295** (2013.01); **B09B 3/70** (2022.01); **B29B 17/00** (2013.01); **B09B 2101/75** (2022.01); **B09B 2101/85** (2022.01); **B29K 2067/003** (2013.01); **C08J 2367/02** (2013.01)

(58) **Field of Classification Search**

CPC **C08J 11/24**; **C08J 2367/02**; **B01J 31/0292**; **B01J 31/0295**
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,504,121 A 4/1996 West
9,255,194 B2 2/2016 Allen et al.

2002/0169071 A1 11/2002 Sauvage et al.
2016/0107981 A1 * 4/2016 Vilaplana Artigas B01J 35/33 560/60
2017/0369670 A1 * 12/2017 Van Berkum C08J 11/04
2018/0037710 A1 * 2/2018 Hooghoudt C08J 11/28
2018/0371206 A1 12/2018 Castillo et al.

FOREIGN PATENT DOCUMENTS

CN	100344604	C	10/2007
CN	102731310	A	10/2012
CN	104447341	A	3/2015
CN	107406618	A	11/2017
CN	108212210	A	6/2018
CN	112851502	A	5/2021
JP	8502079	A	3/1996
JP	200053802	A	2/2000
JP	2003512926	A	4/2003
JP	200888096	A	4/2008
JP	2018502977	A	2/2018
JP	2019505373	A	2/2019

OTHER PUBLICATIONS

East, A. J. Polyesters, Thermoplastic. Kirk-Othmer Encyclopedia of Chemical Technology. John Wiley & Sons, Inc. Mar. 24, 2006. (Year: 2006).*

Yamamura et al. Preparation and characterization of (3-aminopropyl) triethoxysilane-coated magnetite nanoparticles. Journal of Magnetism and Magnetic Materials, 2004, 279, 210-217. (Year: 2004).*

Wang et al. Glycolysis of polyethylene terephthalate: Magnetic nanoparticle CoFe₂O₄ catalyst modified using ionic liquid as surfactant. European Polymer Journal, 2021, 155, 110590. (Year: 2021).*

Al-Sabagh et al. Ionic Liquid-Coordinated Ferrous Acetate Complex Immobilized on Bentonite As a Novel Separable Catalyst for PET Glycolysis. Ind. Eng. Chem. Res. 2015, 54, 12474-12481. (Year: 2015).*

Haidong Cheng, Shuangjun Chen, Degradation and Synthesis of Poly (Ethylene Terephthalate) by Functionalized Ionic Liquids, Progress in Chemistry, Apr. 24, 2017, p. 443-449, College of Materials Science and Engineering, Nanjing Tech University, Nanjin China.

* cited by examiner

Primary Examiner — Stephen E Rieth

(74) Attorney, Agent, or Firm — Li & Cai Intellectual Property Office

(57) **ABSTRACT**

A method for recycling polyester fabrics with use of an ionic liquid catalyst is provided, which includes: providing a recycled polyester fabric; and using a chemical de-polymerization liquid to chemically de-polymerize the recycled polyester fabric and form a de-polymerization product that includes bis-2-hydroxyethyl terephthalate (BHET). The chemical de-polymerization liquid is used to chemically de-polymerize the recycled polyester fabric in an environment where a de-polymerization catalyst exists, and the de-polymerization catalyst is the ionic liquid catalyst in a solid state.

8 Claims, 1 Drawing Sheet