

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
22 July 2004 (22.07.2004)

PCT

(10) International Publication Number
WO 2004/060987 A2

- (51) International Patent Classification⁷: **C08J 11/10**
- (21) International Application Number:
PCT/US2003/041283
- (22) International Filing Date:
23 December 2003 (23.12.2003)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
10/330,853 26 December 2002 (26.12.2002) US
- (71) Applicants: **INTERNATIONAL BUSINESS MACHINES CORPORATION** [US/US]; North Castle Drive, Armonk, NY 10504 (US). **THE BOARD OF TRUSTEES OF THE LELAND STANFORD JUNIOR UNIVERSITY** [US/US]; Stanford, CA 94305 (US).
- (72) Inventors: **HEDRICK, James, L.**; 2031 Valley Oak Road, Pleasanton, CA 94588 (US). **KILICKIRAN, Pinar**; Heinrichstrasse 7, Apt. 9, 89077 Ulm (DE). **NYCE, Gregory, W.**; 117 Bernal Road, 70-233, San José, CA 95119 (US). **WAYMOUTH, Robert, M.**; 420 Alger Drive, Palo Alto, CA 94306 (US).
- (74) Agents: **REED, Dianne, E.** et al.; Reed & Eberle LLP, 800 Menlo Avenue, Suite 210, Menlo Park, CA 94025 (US).
- (81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW.
- (84) Designated States (*regional*): ARIPO patent (BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).
- Published:**
— *without international search report and to be republished upon receipt of that report*
- For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

(54) Title: CATALYTIC DEPOLYMERIZATION OF POLYMERS CONTAINING ELECTROPHILIC LINKAGES USING NUCLEOPHILIC REAGENTS

(57) Abstract: A method is provided for carrying out depolymerization of a polymer containing electrophilic linkages in the presence of a catalyst and a nucleophilic reagent, wherein production of undesirable byproducts resulting from polymer degradation is minimized. The reaction can be carried out at a temperature of 80°C or less, and generally involves the use of an organic, nonmetallic catalyst, thereby ensuring that the depolymerization product(s) are substantially free of metal contaminants. In an exemplary depolymerization method, the catalyst is a carbene compound such as an N-heterocyclic carbene, or is a precursor to a carbene compound. The method provides an important alternative to current recycling techniques such as those used in the degradation of polyesters, polyamides, and the like.



WO 2004/060987 A2