(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
7 March 2013 (07.03.2013)

WIPO | PCT

(10) International Publication Number
WO 2013/030816 A1

(51) International Patent Classification:
C12P 7/64 (2006.01)

(21) International Application Number:
PCT/IL2011/000699

(22) International Filing Date:
31 August 2011 (31.08.2011)

(25) Filing Language: English

(26) Publication Language: English

(71) Applicant *(for all designated States except US)*: **TRANS BIO-DIESEL LTD.** [IL/IL]; Regional R & D Center, P.O. Box 437, 20200 Shfaram (IL).

(72) Inventors; and
(75) Inventors/Applicants *(for US only)*: **BASHEER, Sobhi** [IL/IL]; P.O. Box 9327, 20173 Sakhnine (IL). **EGBARIEH, Ahmad** [IL/IL]; Musherfeh, 30920 Maeleh Eron (IL). **MASRI, Ramez** [IL/IL]; 20137 Nahef (IL).

(74) Agent: **REINHOLD COHN AND PARTNERS**; P.O.Box 13239, 61131 Tel Aviv (IL).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

— *of inventorship (Rule 4.17(iv))*

Published:

— *with international search report (Art. 21(3))*

(54) **Title**: ENZYMATIC TRANSESTERIFICATION WITH LIPASES IMMOBILIZED ON HYDROPHOBIC RESINS IN WATER SOLUTIONS

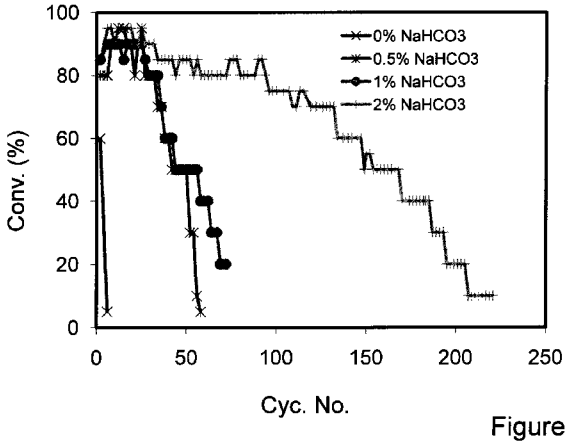


Figure 2

(57) **Abstract**: Disclosed are an enzymatic batchwise or continuous process for the production of fatty acid alkyl esters for use in the biofuels, food and detergent industries and a system therefor. The process utilizes enzymes immobilized on a hydrophobic resin mixed with a fatty acid source and an alcohol or alcohol donor in the presence of an alkaline or mild alkaline aqueous buffer, or in the presence of water or aqueous solution. The production process for fatty acid alkyl esters is carried out by transesterification or esterification simultaneously or sequentially. The biocatalyst activity is maintained with no significant activity losses in multiple uses and also avoids the accumulation of glycerol and water by-products or other hydrophilic compounds on the biocatalyst.

WO 2013/030816 A1