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

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
4 October 2012 (04.10.2012)

WIPO | PCT

(10) International Publication Number
WO 2012/135789 A2

(51) International Patent Classification:
C12P 7/40 (2006.01)

(21) International Application Number:
PCT/US2012/031733

(22) International Filing Date:
30 March 2012 (30.03.2012)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:

61/471,078	1 April 2011 (01.04.2011)	US
61/571,232	22 June 2011 (22.06.2011)	US
61/509,560	19 July 2011 (19.07.2011)	US
61/510,054	20 July 2011 (20.07.2011)	US
61/512,348	27 July 2011 (27.07.2011)	US

(71) Applicant *(for all designated States except US)*: **GENOMATICA, INC.** [US/US]; 10520 Wateridge Circle, San Diego, CA 92121 (US).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **BURK, Mark, J.** [US/US]; 10520 Wateridge Circle, San Diego, CA 92121 (US). **BURGARD, Anthony, P.** [US/US]; 10520 Wateridge Circle, San Diego, CA 92121 (US). **OSTERHOUT, Robin, E.** [US/US]; 10520 Wateridge Circle, San Diego, CA 92121 (US). **SUN, Jun** [CN/US]; 10520 Wateridge Circle, San Diego, CA 92121 (US). **PHARKYA, Priti** [IN/US]; 10520 Wateridge Circle, San Diego, CA 92121 (US).

(74) Agents: **GAY, David, A.** et al.; Jones Day, 222 East 41st Street, New York, NY 10017-6702 (US).

(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, RW, 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).

Published:

— *without international search report and to be republished upon receipt of that report (Rule 48.2(g))*

— *with sequence listing part of description (Rule 5.2(a))*

WO 2012/135789 A2

(54) **Title**: MICROORGANISMS FOR PRODUCING METHACRYLIC ACID AND METHACRYLATE ESTERS AND METHODS RELATED THERETO

(57) **Abstract**: The invention provides a non-naturally occurring microbial organism having a methacrylic acid, methacrylate ester, 3-hydroxyisobutyrate and/or 2-hydroxyisobutyrate pathway. The microbial organism contains at least one exogenous nucleic acid encoding an enzyme in a methacrylic acid pathway. The invention additionally provides a method for producing methacrylic acid, methacrylate ester, 3-hydroxyisobutyrate and/or 2- hydroxyisobutyrate. The method can include culturing methacrylic acid, methacrylate ester, 3-hydroxyisobutyrate and/or 2-hydroxyisobutyrate producing microbial organism, where the microbial organism expresses at least one exogenous nucleic acid encoding a methacrylic acid pathway enzyme in a sufficient amount to produce methacrylic acid, methacrylate ester, 3-hydroxyisobutyrate and/or 2-hydroxyisobutyrate, under conditions and for a sufficient period of time to produce methacrylic acid, methacrylate ester, 3-hydroxyisobutyrate and/or 2-hydroxyisobutyrate.