



(51) International Patent Classification:

B01D 37/02 (2006.01) **C02F 1/56** (2006.01)
B01D 21/00 (2006.01)

(21) International Application Number:

PCT/CA2011/050602

(22) International Filing Date:

27 September 2011 (27.09.2011)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

61/387,575 29 September 2010 (29.09.2010) US

(71) Applicant (for all designated States except US): **HIGH-MARK RENEWABLES RESEARCH LIMITED PARTNERSHIP** [CA/CA]; P.O. Box 130, Vegreville, Alberta T9C 1R1 (CA).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **ZENG, Le (Larry)** [CA/CA]; 1211 McAllister Way SW, Edmonton, Alberta T6W 1X7 (CA). **LI, Xiaomei** [CA/CA]; 1124-111A Street, Edmonton, Alberta T6J 6R9 (CA).

(74) Agents: **FRITZ, Joachim T.** et al.; Borden Ladner Gervais LLP, World Exchange Plaza, 100 Queen Street, Suite 1100, Ottawa, Ontario K1P 1J9 (CA).

(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).

Declarations under Rule 4.17:

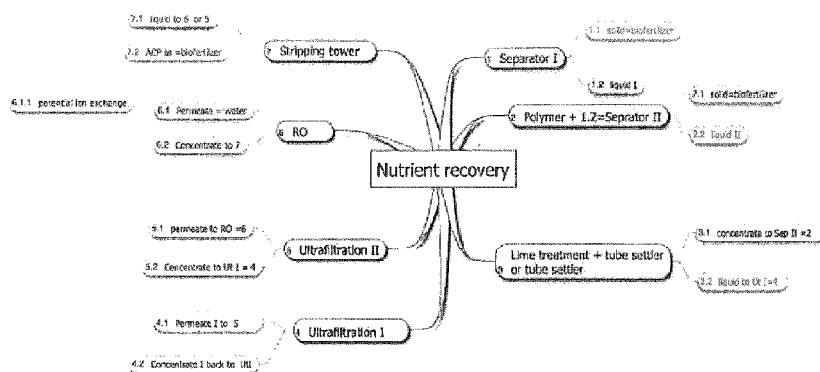
— as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))

Published:

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

(54) Title: NUTRIENT RECOVERY METHODS AND USES THEREOF

FIG. 1



(57) Abstract: Provided herein is an efficient solid-liquid separation method for bio-waste material treatment. The method contemplates the addition of certain cationic polyelectrolytes (or "polymers" as used herein) to the bio-waste materials prior to solid-liquid separation, such as centrifugation, thus greatly facilitate the subsequent solid-liquid separation step. The liquid portion, once separated from solid portion using the subject methods, can be subjected to further downstream nutrient recovery manipulations (such as phosphate precipitation and ammonia stripping) with potentially better efficiency, or may be used directly in a number of operations, such as a liquid diluent for feedstocks in an ethanol plant.