



- (51) **International Patent Classification:**
B01D 61/36 (2006.01) *B01D 71/06* (2006.01)
- (21) **International Application Number:**
PCT/SG2014/000349
- (22) **International Filing Date:**
24 July 2014 (24.07.2014)
- (25) **Filing Language:** English
- (26) **Publication Language:** English
- (30) **Priority Data:**
61/857,821 24 July 2013 (24.07.2013) US
- (71) **Applicant:** NATIONAL UNIVERSITY OF SINGAPORE [SG/SG]; 21 Lower Kent Ridge Road, Singapore 119077 (SG).
- (72) **Inventors:** SHI, Gui Min; c/o National University of Singapore, Faculty of Engineering, Department of Chemical & Biomolecular Engineering, 21 Lower Kent Ridge Road, Singapore 119077 (SG). CHUNG, Tai-Shung; c/o National University of Singapore, Faculty of Engineering, Department of Chemical & Biomolecular Engineering, 21 Lower Kent Ridge Road, Singapore 119077 (SG).
- (74) **Agent:** AMICA LAW LLC; 30 Raffles Place, #14-01 Chevron House, Singapore 048622 (SG).

(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, BN, 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, IR, IS, JP, KE, KG, 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, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, 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, 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, KM, 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:** THIN FILM COMPOSITE MEMBRANES FOR PERVAPORATION

(57) **Abstract:** Disclosed is a thin film composite membrane that includes a ceramic support having a thickness of 1 to 10000 µm and a pore size of 1 to 200 nm, a polymeric gutter layer having a thickness of 1 to 10000 nm and bonded covalently or non-covalently onto the ceramic support, and a thin film layer having a thickness of 10 to 1000 nm and bonded covalently onto the polymeric gutter layer. Also disclosed are methods of preparing the above-described thin film composite membrane.

