



## (51) International Patent Classification:

B82Y 40/00 (2011.01) C01G 23/04 (2006.01)  
B82Y 30/00 (2011.01)

## (21) International Application Number:

PCT/SG2014/000435

## (22) International Filing Date:

16 September 2014 (16.09.2014)

## (25) Filing Language:

English

## (26) Publication Language:

English

## (30) Priority Data:

61/878,456 16 September 2013 (16.09.2013) US  
61/951,194 11 March 2014 (11.03.2014) US

(71) Applicant: NANYANG TECHNOLOGICAL UNIVERSITY [SG/SG]; 50 Nanyang Avenue, Singapore 639798 (SG).

(72) Inventors: TANG, Yuxin; c/o Nanyang Technological University, 50 Nanyang Avenue, Singapore 639798 (SG). ZHANG, Yanyan; c/o Nanyang Technological University, 50 Nanyang Avenue, Singapore 639798 (SG). DONG, Zhili; c/o Nanyang Technological University, 50 Nanyang

Avenue, Singapore 639798 (SG). CHEN, Zhong; c/o Nanyang Technological University, 50 Nanyang Avenue, Singapore 639798 (SG). CHEN, Xiaodong; c/o Nanyang Technological University, 50 Nanyang Avenue, Singapore 639798 (SG).

(74) Agent: VIERING, JENTSCHURA & PARTNER LLP; P.O. Box 1088, Rochor Post Office, Rochor Road, Singapore 911833 (SG).

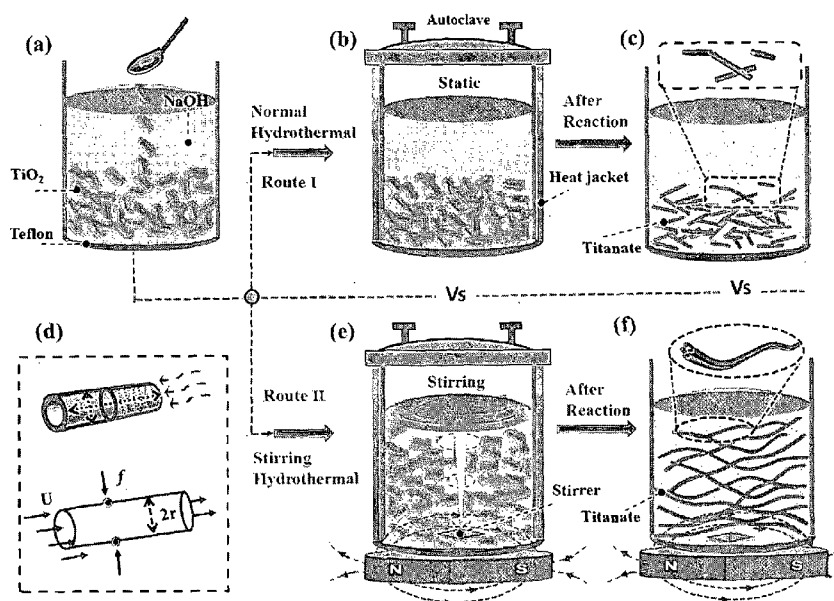
(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KN, KP, KR, KZ, LA, LC, LK, LR, LS, 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, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU,

[Continued on next page]

(54) Title: ELONGATED TITANATE NANOTUBE, ITS SYNTHESIS METHOD, AND ITS USE

FIG. 28



(57) Abstract: The invention relates to a method of forming high aspect ratio titanate nanotubes. In particular, the formation of elongated nanotubes having lengths more than  $10\ \mu\text{m}$  involves a modified hydrothermal method. The method allows formation of an entangled network of the elongated nanotubes for use as free-standing membranes or powder form for use in various applications such as water treatment. The elongated nanotubes may also be used for forming electrodes for batteries.



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).

**Published:**

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