



(51) International Patent Classification:

B01J 20/04 (2006.01) C02F 1/72 (2023.01)
B01J 20/28 (2006.01) C02F 101/10 (2006.01)
B01J 20/24 (2006.01) C02F 101/16 (2006.01)
C02F 1/58 (2023.01)

(21) International Application Number:

PCT/SG2022/050346

(22) International Filing Date:

24 May 2022 (24.05.2022)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

10202105544V 25 May 2021 (25.05.2021) SG

(71) Applicant: NATIONAL UNIVERSITY OF SINGAPORE [SG/SG]; 21 Lower Kent Ridge Road, Singapore 119077 (SG).

(72) Inventors: CHEN, Zhihao; c/o National University of Singapore, NUS Environmental Research Institute, 21 Lower Kent Ridge Road, Singapore 119077 (SG). CHEN, Jiaping Paul; c/o National University of Singapore, NUS Environmental Research Institute, 21 Lower Kent Ridge Road,

Singapore 119077 (SG). ONG, Choon Nam; c/o National University of Singapore, NUS Environmental Research Institute, 21 Lower Kent Ridge Road, Singapore 119077 (SG).

(74) Agent: DAVIES COLLISON CAVE ASIA PTE. LTD.; 10 Collyer Quay #07-01, Ocean Financial Centre, Singapore 049315 (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, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IQ, IR, IS, IT, JM, JO, JP, KE, KG, KH, KN, KP, KR, KW, 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, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, WS, 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, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK,

(54) Title: FUNCTIONALIZED BEADS AND THEIR USES THEREOF

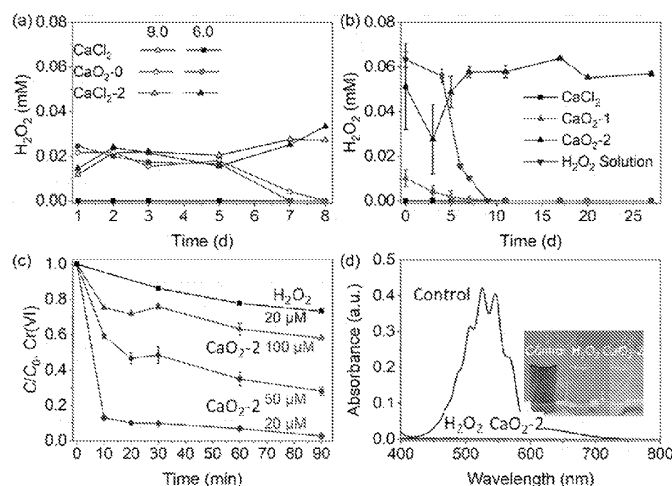


Figure 1

(57) Abstract: The present disclosure relates to a functionalised bead having a core and a surface, comprising peroxide moieties within the core of the bead, and peroxide particles adhered to the surface of the bead. The core comprises anionic and hydrophilic polymers crosslinked with multivalent cations. The functionalized bead has an average diameter of about 0.2 μm to about 10 μm. The peroxide particles have an average diameter of about 10 nm to about 900 nm. The present disclosure also relates to methods of fabricating the functional beads and methods of removing phosphate phosphorus and/or algae from an aqueous medium.

[Continued on next page]

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:

- *without international search report and to be republished upon receipt of that report (Rule 48.2(g))*
- *in black and white; the international application as filed contained color or greyscale and is available for download from PATENTSCOPE*