

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
28 July 2005 (28.07.2005)

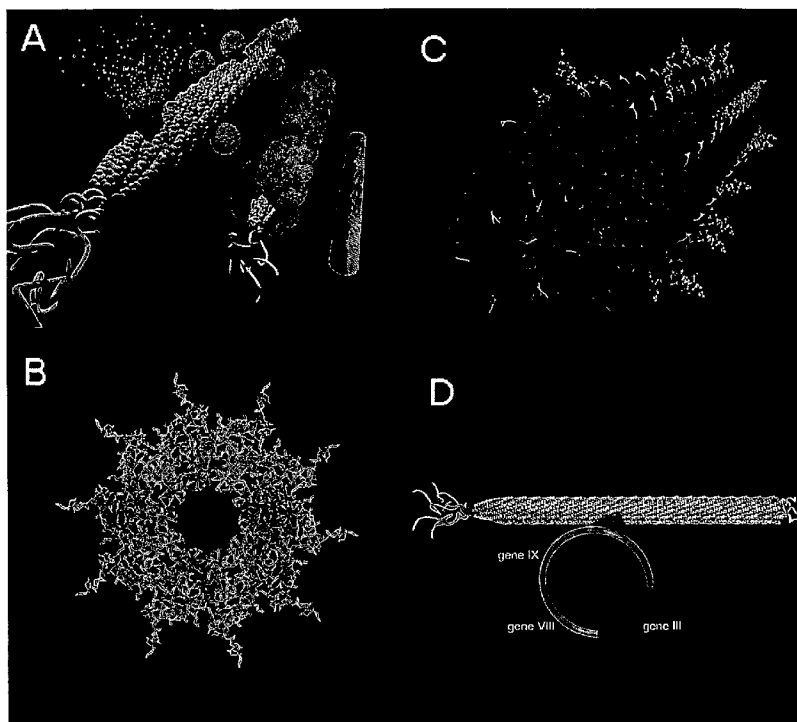
PCT

(10) International Publication Number
WO 2005/067683 A2

- (51) International Patent Classification: **Not classified**
- (21) International Application Number:
PCT/US2005/000075
- (22) International Filing Date: 5 January 2005 (05.01.2005)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
60/534,102 5 January 2004 (05.01.2004) US
10/976,179 29 October 2004 (29.10.2004) US
- (71) Applicants (for all designated States except US): **BOARD OF REGENTS, THE UNIVERSITY OF TEXAS SYSTEM?** [US/US]; 201 West 7th Street, Austin, Texas 78701 (US). **MASSACHUSETTS INSTITUTE OF TECHNOLOGY, INC.** [US/US]; 77 Massachusetts Avenue, Cambridge, MA 02139 (US).
- (72) Inventors; and
- (75) Inventors/Applicants (for US only): **BELCHER, Angela, M.** [US/US]; 35 Balfour Street, Lexington, MA 02421 (US). **MAO, Chuanbin** [CN/US]; 2314 Parker Lane #8, Austin, TX 78741 (US). **SOLIS, Daniel, J.** [US/US]; 1700 Justin Lane, Austin, TX 78757 (US).
- (74) Agents: **MAEBIUS, Stephen, B.** et al.; Foley & Lardner LLP, Washington Harbour., 3000 K Street N.W., Suite 500, Washington, DC 20007-5143 (US).
- (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

[Continued on next page]

(54) Title: INORGANIC NANOWIRES



(57) Abstract: An inorganic nanowire having an organic scaffold substantially removed from the inorganic nanowire, the inorganic nanowire consisting essentially of fused inorganic nanoparticles substantially free of the organic scaffold, and methods of making same. For example, a virus-based scaffold for the synthesis of single crystal ZnS, CdS and free-standing L10 CoPt and FePt nanowires can be used, with the means of modifying substrate specificity through standard biological methods. Peptides can be selected through an evolutionary screening process that exhibit control of composition, size, and phase during nanoparticle nucleation have been expressed on the highly ordered filamentous capsid of the M13 bacteriophage. The incorporation of specific, nucleating peptides into the generic scaffold of the M13 coat structure can provide a viable template for the directed synthesis of a variety of materials including semiconducting

and magnetic materials. Removal of the viral template via annealing can promote oriented aggregation-based crystal growth, forming individual crystalline nanowires. The unique ability to interchange substrate specific peptides into the linear selfassembled filamentous construct of the M 13 virus introduces a material tunability not seen in previous synthetic routes. Therefore, this system provides a genetic tool kit for growing and organizing nanowires from various materials including semiconducting and magnetic materials.



(84) **Designated States** (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO, SE, SI, SK, 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

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.