PCT WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 : H01L 33/00 | A1

(11) International Publication Number: WO 99/65085

(43) International Publication Date: 16 December 1999 (16.12.99)

(21) International Application Number: PCT/CA99/00521

(22) International Filing Date: 4 June 1999 (04.06.99)

(30) Priority Data:
09/090,975 5 June 1998 (05.06.98) US

(71) Applicant: THE GOVERNING COUNCIL OF THE UNIVERSITY OF TORONTO [CA/CA]; Simcoe Hall, 27 King's College Circle, Toronto, Ontario M5S 1A1 (CA).

(72) Inventors: DAG, Omer; Apartment 1402, 10 Walmer Road, Toronto, Ontario M5R 2W4 (CA). OZIN, Geoffrey, A.; 63 Gormley Avenue, Toronto, Ontario M4V 1Y9 (CA). YANG, Hong; Apartment 1714, 30 Charles Street West, Toronto, Ontario M4Y 1R5 (CA).

(74) Agent: HIRONS, Robert, G.; 18th floor, 150 Metcalfe Street, Ottawa, Ontario K2P 1P1 (CA).

(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, 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, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published
With international search report.

(54) Title: FAST LUMINESCENT SILICON

(57) Abstract

There are provided mesoporous silica materials containing in their pores stabilized clusters of silicon atoms, of size 2 nanometers or less, and capable of photoluminescence to emit fast photons. They are prepared by chemical vapour deposition of silicon or a silicon precursor such as disilane, under soft conditions such as temperature of 100–150 °C, into the mesopores of silicate films which have mesoporous channels prepared by growth of the films using a template to control their sizes, but without removing the template residues from the films prior to the chemical vapour deposition. The template residues serve to limit the size of the silicon clusters which conform. The use of the soft conditions on CVD retains the template residues in an intact, substantially unchanged form. The resultant films have clusters of silicon, of 2 nanometer size or less, anchored to the mesopores, and air stable, so that they can be used in optoelectronic devices in conjunction with standard silicon semiconductors.

