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[Continued on next page]

(54) Title: SYNTHESIS OF SILICON CONTAINING MATERIALS USING LIQUID HYDROSILANE COMPOSITIONS THROUGH DIRECT INJECTION

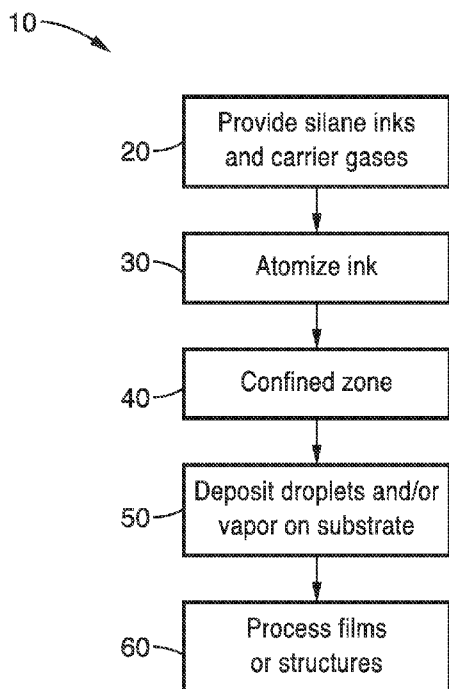


FIG. 1

(57) Abstract: An apparatus and a non-vapor-pressure dependent method of chemical vapor deposition of Si based materials using direct injection of liquid hydrosilane(s) are presented. Liquid silane precursor solutions may also include metal, non-metal or metalloids dopants, nanomaterials and solvents. An illustrative apparatus has a precursor solution and carrier gas system, atomizer and deposit head with interior chamber and a hot plate supporting the substrate. Atomized liquid silane precursor solutions and carrier gas moves through a confined reaction zone that may be heated and the aerosol and vapor are deposited on a substrate to form a thin film. The substrate may be heated prior to deposition. The deposited film may be processed further with thermal or laser processing.





**(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).

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- *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))*

## INTERNATIONAL SEARCH REPORT

International application No.  
**PCT/US2014/029451****A. CLASSIFICATION OF SUBJECT MATTER****C23C 16/44(2006.01)i, C23C 16/46(2006.01)i, C23C 16/52(2006.01)i**

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

C23C 16/44; H01L 21/20; C23C 16/448; C23C 4/12; B32B 027/38; C23C 16/00; C23C 16/46; C23C 16/52

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models  
Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal) &amp; keywords: silane, liquid, aerosol, atomizing, and depositing

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2008-0009126 A1 (ASLAMI et al.) 10 January 2008 See paragraphs [0030],[0031],[0042]-[0050]; claims 4,13-17,31; and figures 1, 5.	1-17
A		18-20
Y	US 2008-0268165 A1 (FEKETY et al.) 30 October 2008 See paragraphs [0030],[0032] and claims 1,4,5,7-11.	1-16
Y	US 2003-0215644 A1 (DESHPANDE et al.) 20 November 2003 See paragraphs [0048],[0055]-[0057],[0060]; claims 1,69; and figures 1,4.	17
A	US 2010-0009095 A1 (WARD et al.) 14 January 2010 See paragraph [0069]; claims 1-3,41,58; and figure 2.	1-20
A	US 6045864 A (LYONS et al.) 04 April 2000 See column 4, line 50 - column 5, line 44 and figure 1a.	1-20

 Further documents are listed in the continuation of Box C. See patent family annex.

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"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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"&amp;" document member of the same patent family


Date of the actual completion of the international search

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## INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

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