



(51) International Patent Classification:

C23C 14/34 (2006.01) C23C 14/22 (2006.01)
C23C 14/30 (2006.01) C23C 14/00 (2006.01)

(21) International Application Number:

PCT/US2011/035581

(22) International Filing Date:

6 May 2011 (06.05.2011)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

61/331,844 6 May 2010 (06.05.2010) US
61/366,711 22 July 2010 (22.07.2010) US

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(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, 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, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, RO, RS, RU, 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.

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(54) Title: SPOTLESS ARC DIRECTED VAPOR DEPOSITION (SA-DVD) AND RELATED METHOD THEREOF

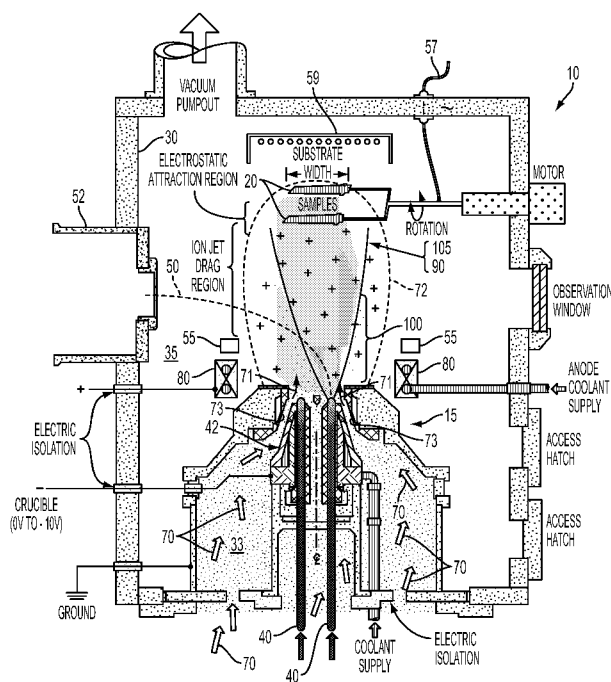


FIG. 1

(57) Abstract: A plasma assisted directed vapor deposition process that utilizes a spotless arc directed vapor deposition (SA-DVD) method for the creation of the plasma in a directed vapor deposition apparatus. Vapor is created by electron or other high intensity directed energy beam evaporation from one or more source materials contained in a water cooled crucible. This vapor is entrained in a transonic helium or other gas jet and transported to a substrate for deposition. The electron or other directed energy beam used for evaporation is simultaneously exploited to ionize the vapor and the jet forming gas (helium, or other gases including combinations of inert and reactant gases). An anode positioned near the electron beam impingement position attracts scattered electrons formed during the directed energy beams interaction with a target surface and enables the formation of an intense plasma. This plasma is at first transported towards the substrate by the vapor entraining gas jet through an ion-drag mechanism. However, if the substrate is sufficiently charged (electrically biased), the plasma ions are electrostatically accelerated towards the substrate and this extra momentum aids in vapor transport and deposition on a component surface.



(84) **Designated States** (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, 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, ML, MR, NE, SN, TD, TG).

Published:

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