(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
20 June 2013 (20.06.2013)

WIPO | PCT

(10) International Publication Number
WO 2013/090740 A1

(51) International Patent Classification:
C23C 4/12 (2006.01)

(21) International Application Number:
PCT/US2012/069781

(22) International Filing Date:
14 December 2012 (14.12.2012)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
61/570,503 14 December 2011 (14.12.2011) US
61/570,525 14 December 2011 (14.12.2011) US

(71) Applicant: **PRAXAIR S. T. TECHNOLOGY, INC.** [US/US]; 441 Sackett Point Road, New Haven, CT 06473 (US).

(72) Inventors: **PETORAK, Christopher, A.**; 664 Beaverbrook Drive, Carmel, IN 46032 (US). **LEMEN, Don, J.**; 7655 Moran Court, Indianapolis, IN 46268 (US). **FEUERSTEIN, Albert**; 12862 Tuscany Blvd., Carmel, IN 46032 (US). **LEWIS, Thomas, F, III**; 345 W. Cedar Street, Zionsville, IN 46077 (US). **McCOY, Mark**; 1755 W. Miller Street, Indianapolis, IN 46221-1857 (US).

(74) Agents: **DALAL, Nilay, S.** et al.; Praxair, Inc., 39 Old Ridgebury Road, Danbury, CT 06810 (US).

(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, 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, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, 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.

(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, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*

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

Published:

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

— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*

(54) Title: SYSTEM AND METHOD FOR UTILIZATION OF SHROUDED PLASMA SPRAY OR SHROUDED LIQUID SUSPENSION INJECTION IN SUSPENSION PLASMA SPRAY PROCESSES

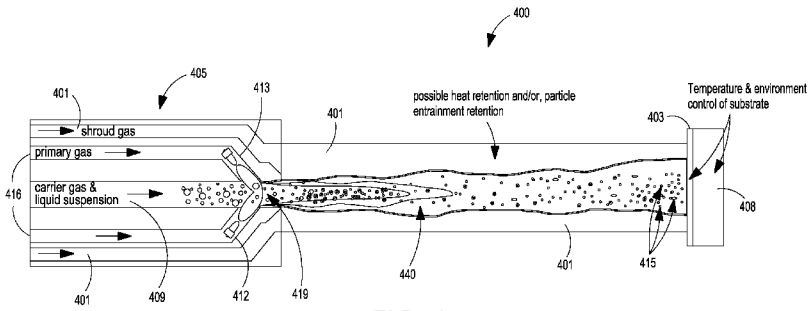


FIG. 4

(57) Abstract: A system and method for producing thermal spray coatings on a substrate from a liquid suspension is disclosed. The disclosed system and method include a thermal spray torch for generating a plasma and a liquid suspension delivery subsystem for delivering a flow of liquid suspension with sub-micron particles to the plasma to produce a plasma effluent. The liquid suspension delivery subsystem comprises an injector or nozzle which can produce an inert or reactive gas sheath partially or fully surrounding the plasma effluent. A sheath can also be used to isolate injection of the liquid suspension. A gas assist stream can also be employed at or near the suspension injection point. The shroud, sheath or gas assist technique can retain the sub-micron particles entrained within the plasma effluent and substantially prevent entrainment of ambient gases into the plasma effluent. The liquid suspension delivery subsystem can be arranged as an axial injection system, a radial internal injection system or an external radial injection system.

WO 2013/090740 A1