



- (51) International Patent Classification:
E21B 47/07 (2012.01) *G01V 5/04* (2006.01)
- (21) International Application Number:
PCT/US2014/060682
- (22) International Filing Date:
15 October 2014 (15.10.2014)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
1360432 25 October 2013 (25.10.2013) FR
61/904,906 15 November 2013 (15.11.2013) US
- (71) Applicant: SAINT-GOBAIN CERAMICS & PLASTICS, INC. [US/US]; One New Bond Street, Worcester, Massachusetts 01615-0138 (US).
- (72) Inventors: YANG, Kan; 32405 Franklin Drive, Solon, Ohio 44139 (US). MENGE, Peter R.; 8387 Whispering Pines Drive, Novelty, Ohio 44073 (US). LEJAY, Julien; 6-bis, rue Jules Parent, F-92500 Rueil Malmaison (FR). OUSPENSKI, Vladimir; 12 allée Fregate, F-77140 Saint-Pierre les Nemours (FR).
- (74) Agents: ABEL LAW GROUP, LLP et al.; 8911 N Capital of Texas Hwy, Bldg. 4, Suite 4200, Austin, Texas 78759 (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, IR, IS, JP, KE, KG, KN, KP, KR, KZ, LA, LC, LK, LR, LS, 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, SA, 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, ST, 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).

[Continued on next page]

(54) Title: SCINTILLATOR AND PULSE SHAPE DISCRIMINATION FOR USE WITH THE SCINTILLATOR

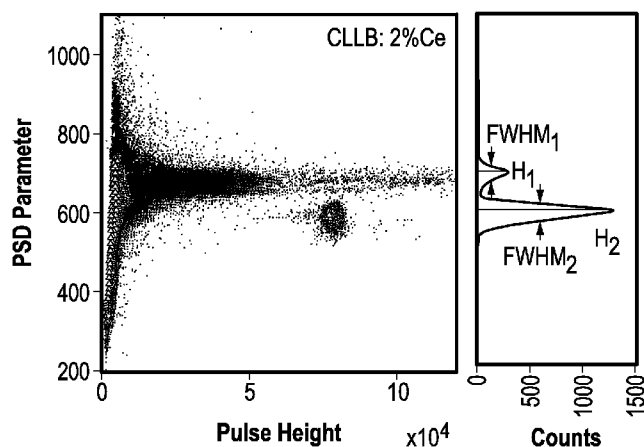


FIG. 3

(57) Abstract: In an embodiment, scintillator can have a Figure of Merit of 0.4 at a temperature greater than 120°C, a Figure of Merit of at least 0.05 at a temperature of at least 160°C, or both. In another embodiment, a scintillator can include a Br-containing or an I-containing elpasolite. Either scintillator can be used in a radiation detection apparatus that include a photo-sensor and a radiation detection apparatus. Such an apparatus can be used to detect and discriminate two different types of radiation over a wide range of temperatures. The radiation detection apparatus can be useful in drilling, well logging, or as a portal detector.

**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))*