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 61/314,840 17 March 2010 (17.03.2010) US</p> <p>(71) Applicant <i>(for all designated States except US):</i> DOW GLOBAL TECHNOLOGIES LLC [US/US]; 2040 Dow Center, Midland, Michigan 48674 (US).</p> <p>(72) Inventors; and</p> <p>(75) Inventors/Applicants <i>(for US only):</i> GERBL, Jennifer E. [US/US]; 3320 N. Sturgeon Road, Midland, Michigan 48642 (US). LANGLOIS, Marc G. [US/US]; 2444 North Deer Valley Road, Midland, Michigan 48642 (US). NILSSON, Robert T. [US/US]; 735 Wilderness Drive, Midland, Michigan 48640 (US).</p> | <p>(74) Agents: PARINS, Paul J. et al.; Kagan Binder, PLLC, Suite 200, Maple Island Building, 221 Main Street North, Stillwater, Minnesota 55082 (US).</p> <p>(81) Designated States <i>(unless otherwise indicated, for every kind of national protection available):</i> 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, KG, 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.</p> <p>(84) Designated States <i>(unless otherwise indicated, for every kind of regional protection available):</i> 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).</p> |
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- (54) Title:** CHALCOGENIDE-BASED MATERIALS AND IMPROVED METHODS OF MAKING SUCH MATERIALS

- (57) Abstract:** The present invention provides strategies for making high quality CIGS photoabsorbing materials from precursor films that incorporate a sub-stoichiometric amount of chalcogen(s). Chalcogen(s) are incorporated into the CIGS precursor film via co-sputtering with one or more other constituents of the precursor. Optional annealing also may be practiced to convert precursor into more desirable chalcopyrite crystalline form in event all or a portion of the precursor has another constitution. The resultant precursors generally are sub-stoichiometric with respect to chalcogen and have very poor electronic characteristics. The conversion of these precursors into CIGS photoabsorbing material via chalcogenizing treatment occurs with dramatically reduced interfacial void content. The resultant CIGS material displays excellent adhesion to other layers in the resultant photovoltaic devices. Ga migration also is dramatically reduced, and the resultant films have optimized Ga profiles in the top or bottom portion of the film that improve the quality of photovoltaic devices made using the films.

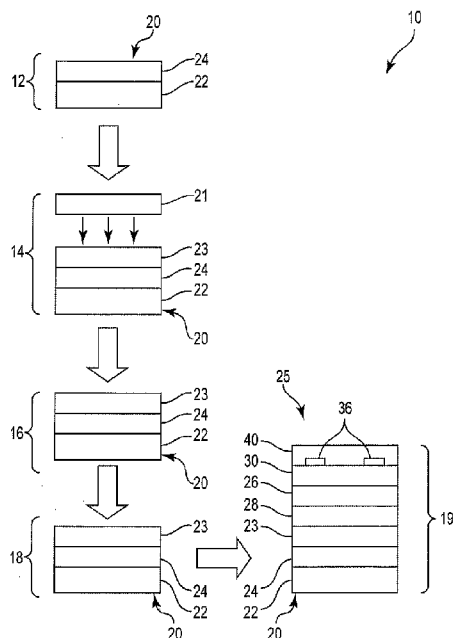


Fig. 1

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