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(71) Applicant *(for all designated States except US)*: **DAY4 ENERGY INC.** [CA/CA]; #101-5898 Trapp Avenue, Burnaby, B.C. V3N 5G4 (CA).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **RUBIN, Leonid B.** [CA/CA]; 1603 - 6188 Patterson Avenue, Burnaby, British Columbia V5N 2N1 (CA). **SADLIK, Bram** [CA/CA]; 403 East 21 st Avenue, Vancouver, British Columbia V5V 1R3 (CA). **OSIPOV, Alexander** [RU/CA]; 931 London Place, New Westminster, British Columbia V3M 4Z5 (CA).

(74) Agents: **KNOX, John W.** et al.; Fetherstonhaugh & Co., Box 11560, Vancouver Centre, 650 West Georgia Street, Suite 2200, Vancouver, British Columbia V6B 4N8 (CA).

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(54) Title: CRYSTALLINE SILICON PV CELL WITH SELECTIVE EMITTER PRODUCED WITH LOW TEMPERATURE PRECISION ETCH BACK AND PASSIVATION PROCESS

(57) Abstract: A method of forming a selective emitter in a photovoltaic (PV) crystalline silicon semiconductor wafer involves forming a mask on a front side surface of the wafer to create masked and unmasked areas on the front side surface. A first silicon oxide layer is electrochemically formed at the unmasked areas of the front side surface such that the silicon oxide layer extends into an emitter of the wafer at least as far as a dead zone therein. The mask is removed and the first silicon oxide layer is etched back until substantially all of the first silicon oxide layer is removed. A second silicon oxide layer is then electrochemically formed on the front side surface such that the second silicon oxide layer has sufficient thickness to passivate the front side surface. The method may alternatively involve forming an emitter by diffusing a dopant through a first electrochemically formed silicon oxide layer formed in unmasked areas of a PV crystalline silicon semiconductor wafer having no semiconductor junction and then etching back the first silicon oxide layer and passivating with a second electrochemically formed silicon oxide layer.

FIG. 1A

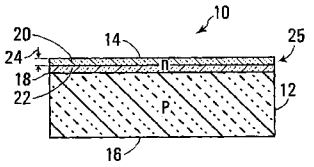


FIG. 1B

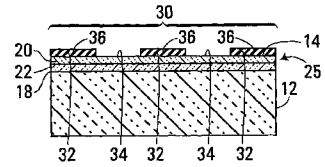


FIG. 1C

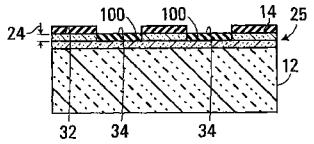


FIG. 1D

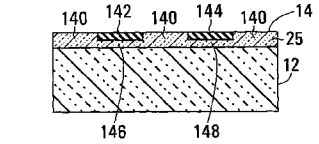
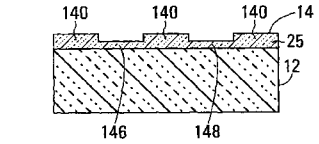


FIG. 1E



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