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Silicon Solar Cells with Bifacial Metal Oxides Carrier Selective Layers

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Abstract

Silicon heterojunction (SHJ) solar cells, constructed with hydrogenated amorphous silicon (a-Si:H) carrier-selective layers and a crystalline silicon substrate, are promising alternatives to conventional monocrystalline silicon solar cells. However, the undesirable characteristics like high parasitic light-absorption and low conductivity of the doped a-Si:H carrier limit further improvement of the performance of SHJ solar cells. In our design, MoO_x is chosen as the hole-selective layer of the silicon heterojunction solar cell to reduce the parasitic incident-light absorption. In particular, lightly boron-doped zinc oxide (ZnO:B) films with high conductivities and low refractive indices, instead of the common heavily phosphorus-doped a-Si:H (n⁺-a-Si:H), are directly deposited as electron-selective layers to achieve low resistivity ohmic contact and an excellent optical back-reflectance. Compared to

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