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## Post-deposition Catalytic-doping of Microcrystalline Silicon Thin Layer for Application in Silicon Heterojunction Solar Cell

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### Abstract

The silicon heterojunction (SHJ) solar cell is one of the most promising candidates for the next-generation high-efficiency mainstream photovoltaic technology. It consists of a crystalline silicon wafer coated with a stack of functional thin-films on both sides. Conventionally, intrinsic and doped hydrogenated amorphous silicon (a-Si:H) is used as the passivation layer and emitter or back surface field (BSF), respectively. Hydrogenated microcrystalline silicon ( $\mu\text{c-Si:H}$ ) is considered as a more advantageous alternative to the a-Si:H emitter and BSF layers due to  $\mu\text{c-Si:H}$ 's higher electrical conductivity giving rise to lower series resistance. In this contribution, we use the catalytic doping process, so-called "Cat-doping", to post-dope n- $\mu\text{c-Si:H}$  thin-layers in such a way that the conductivity can be increased to higher levels than those achievable in as-grown n- $\mu\text{c-Si:H}$  for the application in SHJ solar cells. We show that the conductivity of the  $\mu\text{c-Si:H}$  films notably increases after the Cat-doping. We also investigated the impact of Cat-doping on the conductivity of the different  $\mu\text{c-Si:H}$  and on lifetime.

Keywords: Cat-doping; shallow doping; microcrystalline silicon; conductivity; lifetime; heterojunction

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