

عنوان مقاله:

Design and Simulation of Rear Emitter Heterojunction Solar Cell with Silicon Carbide Front Surface Field Layer

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نویسنده:

Saied Marjani - Khorasan Regional Electrical Company, Mashhad ۹۱۷۳۵۱۸۵, Iran

خلاصه مقاله:

In this article, the rear junction heterojunction solar cells with siliconcarbide (SiC) front surface field (FSF) layer are proposed and investigated. The rear junction solar cells with a p-type emitter have gained significant attention, especially in the context of silicon (Si) heterojunction cells. Heterojunction cells offer several advantages over front junction cells. In front junction cells, the high/low junction configuration can lead to a loss of two-dimensional carrier collection. In contrast, the rear emitter structure in heterojunction cells is less impacted by optical losses due to its thickness. Additionally, the rear emitter structure provides more flexibility in terms of structural design, sheet resistance, and surface morphology. The proposed structure includes a Si heterostructure with a SiC layer as the front surface field and Al₂O₃ and SiN passivation layers at the rear and front surfaces, respectively. By incorporating a wideband gap front layer of SiC as the front surface field, we obtained an improved efficiency of about ۲۷.۲۳% and an open-circuit voltage of ۷۱۴ mV.

کلمات کلیدی:

Rear junction heterojunction, Silicon carbide (SiC), Front surface field (FSF), Solar cells

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