

Abstract Submitted
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A novel nano-structured GaAs solar cell DONG LIANG, ANJIA GU, YIJIE HUO, Stanford University, JINGZHOU YAN, OEpic Semiconductors Inc., SHUANG LI, ERIK GARNETT, EVAN PICKETT, YANGSEN KANG, MEIYUEH TAN, ANTONIO XAVIER CERRUTO, JIA ZHU, CHING-MEI HSU, YAN YAO, Stanford University, MAJID RIAZIAT, OEpic Semiconductors Inc., YI CUI, JAMES S. HARRIS, Stanford University — In this presentation, we will demonstrate a novel solar cell with nano-structured dense arrays of single crystal GaAs conformally grown on nanopillar templates with wafer-scale uniformity. The template is prepared via plasma enhanced etching with a monolayer of SiO₂ nanospheres as a mask followed by wet chemical etching. The GaAs p-n junction with an AlGaAs passivation window layer is grown via metal-organic chemical vapor deposition (MOCVD). The rectangular shape of the nano single crystal GaAs reveals anisotropic lateral growth rates of GaAs along (011) and (011̄) directions, which can be engineered by tuning the AsH₃ flow and temperature during growth. Optical absorption measurements show the outstanding light trapping properties of the nano-structured cell, which agree with the simulation results. I-V characteristics show an efficiency of 1.67% for the nano GaAs solar cell, which is 15% higher than its planar control cell with the same thickness of 200nm. The efficiency is the highest among all the large area GaAs nanowire core-shell solar cells reported in literature by 2010.

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