

Black silicon solar cells with record 18.7% efficiency

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Scientists at Aalto University, Finland and Fraunhofer ISE, Germany report an efficiency of 18.7% for black silicon solar cells, the highest efficiency reported so far for a black silicon solar cell.

The researchers were able to apply a boron diffusion to create a pn-junction, maintaining the excellent optical properties of the black [silicon structure](#). By applying atomic layer deposited Al₂O₃, an effective passivation of the nanostructured surfaces was achieved. The previous efficiency record of 18.2% was held by the U.S. Department of Energy's National Renewable Energy Laboratory (NREL) using thermal oxidation as a passivating layer.

"The [quantum efficiency](#) measurements reveal that the nanostructured front surface is of a high electrical quality comparable to a pyramidal textured surface," says Assistant Professor Hele Savin of Aalto University.

Routes for improving the cell efficiency are already identified, and efficiencies clearly above 20% should be within reach.

The paper, 'Passivation of Black Silicon Boron Emitters with ALD Al₂O₃' by Päivikki Repo, Ville Vähänissi, Guillaume von Gastrow, Jan Benick, Jonas Schön, Bernd Steinhauser, Martin C. Schubert and Hele Savin, was presented in SiliconPV, the 3rd International Conference on [Crystalline Silicon](#) Photovoltaics, 25-27 March 2013 in Hamelin, Germany.

Provided by Aalto University

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