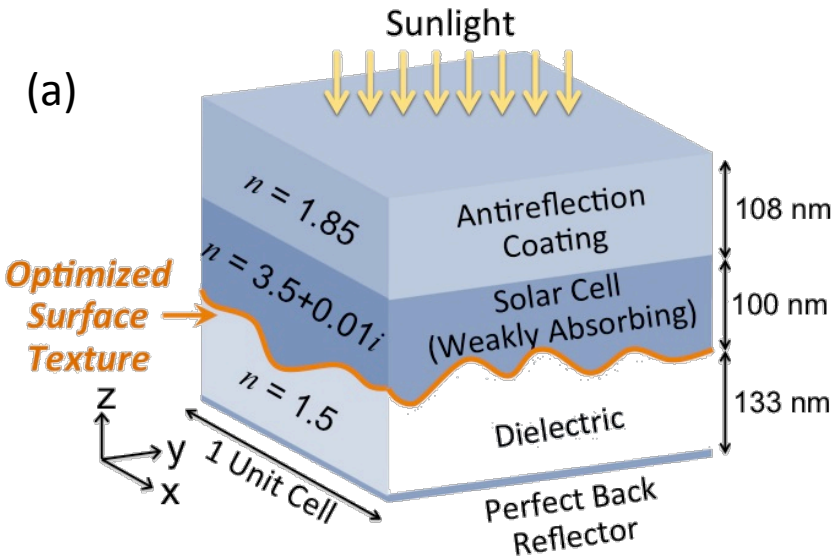
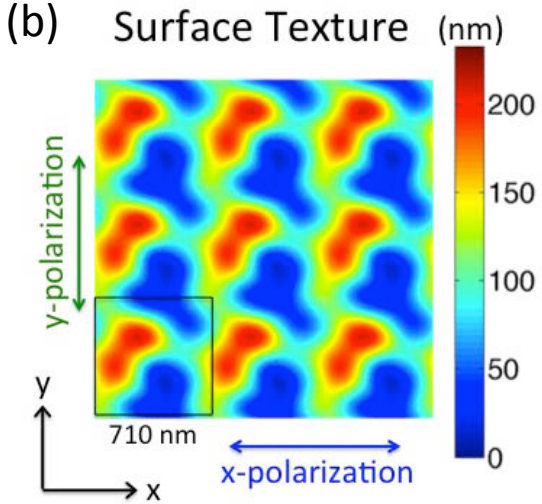
October 2013
Research
Highlight

Computationally Designing Surface Textures for Ultrathin, Efficient Solar Cells





(a) Schematic of optimized structure.

(b) Top-down view of the best texture for a 100 nm thick solar cell.

Scientific Achievement

We computationally determined the optimized surface texture for 100 nm thick solar cells, resulting in an angle- and frequency-averaged absorption enhancement factor of 39.

Significance and Impact

Light trapping by texturing solar cell surfaces can lead to increased solar absorption, higher device efficiency, and reduced material cost.

Research Details

- The interaction of light with the solar cell was simulated with the Finite-Difference Time-Domain method.
- Surface texture optimization was achieved using algorithms that incrementally change the texture and iterate to the optimal solution.

V. Ganapati, O.D. Miller, E. Yablonovitch, *IEEE Journal of Photovoltaics*. DOI: 10.1109/JPHOTOV.2013.2280340

Work was performed at Lawrence Berkeley National Laboratory.