Highlight: Solar - Bridging the gap

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(PhysOrg.com) -- Titanium dioxide, the same inexpensive white pigment that protects us from sunburns, can be converted into a material that absorbs sunlight and could greatly increase the efficiency of solar energy cells.

Until now, however, researchers had not been able to overcome the inherent wide band gap associated with the different energy levels, or bands, of the electrons. This limits the material to absorbing only ultraviolet light and results in less than 1 percent conversion efficiency.

In a paper published by a multi-institutional team that includes theorist Zhenyu Zhang and experimentalist Gyula Eres of Oak Ridge National Laboratory, the researchers report on a conceptually novel doping method that can tune the band gap of titanium oxide to capture the more abundant visible component of the solar spectrum.

This innovation to a large extent removes what has been a major materials barrier to the better utilization of the sun's energy and, in terms of cost and efficiency, has huge implications for future solar cells.

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More information: Band Gap Narrowing of Titanium Oxide Semiconductors by Noncompensated Anion-Cation Codoping for Enhanced Visible-Light Photoactivity, Phys. Rev. Lett. 103, 226401

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