

Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Titanium-Silicon Dioxide as a Transparent Conducting Oxide and an Anti-Reflection Contact for Photovoltaic Applications JOHN CHIVERS, THOMAS VANDERVELDE, Tufts University — We report on the use of Earth-abundant silicon-dioxide and titanium-dioxide as a transparent conducting oxide (TCO) and antireflective (AR) coating. The varied band gap and index of refraction conditions inherent in the SiTiO_2 system allow controlled variation of material properties during monolithic growth. TCOs are a critical component in modern photovoltaic devices, used as a front-side contact that won't block incident light. At present, many TCOs require rare-Earth materials (e.g. Indium), which is problematic for large-scale manufacturing. The abundant, well characterized materials used here can be integrated into an existing product line quickly and cheaply. Some TCOs may also act as an AR coating, further increasing light absorption. The ideal AR coating would gradually change from the index of refraction of air to that of the underlying semiconductor. Most AR coatings used today make this transition in a small number of steps, which limits their efficacy. In this work, we use a deposition process that slowly grades the index of refraction while maintaining conductivity and transparency.

John Chivers
Tufts University

Date submitted: 21 Nov 2009

Electronic form version 1.4