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An Antireflective Top Contact for Optoelectric Devices Using Niobium Doped Titanium Dioxide JOHN CHIVERS, THOMAS VANDERVELDE, Tufts University, REAP LABS TEAM — We present an investigation of an integrated top contact system for optoelectric semiconductor devices (e.g. solar cells, photo-detectors, etc.). Niobium-doped titanium dioxide (TNO) is used as a transparent conductor and a graded TiO_2/SiO_2 layer with a nanostructured SiO_2 surface is added to suppress reflection and improve durability. TNO was chosen to replace indium tin oxide (ITO), the industry standard transparent conductor, in an effort to reduce dependence on increasingly scarce resources (i.e. indium). TNO offers other potential benefits over ITO, including superior durability, higher index of refraction, and superior transparency in the infrared. The graded antireflective layer takes advantage of the common crystalline structure of TiO_2 and SiO_2, making fabrication simpler and more reliable than would be possible if the materials had differing structures. The nanostructured SiO_2 surface uses a "moth's eye" pattern of sub-wavelength-scale cones to create a gradual optical transition from ambient air to the SiO_2. All materials are deposited using RF magnetron sputtering. Results are compared to current standards and the strengths and weaknesses of the TNO system are discussed.

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