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**Synthesis and Optical Properties of Free Standing Titania Nanotubes Arrays for Photovoltaic and Photocatalytic Applications** DALMAU REIG-I-PLESSIS, MOHAMED ABD ELMOULA, EUGEN PANAITESCU, DONALD HEIMAN, LATIKA MENON, Northeastern University — Titanium oxide nanostructures, nanotubes arrays in particular, are key components for several emerging technologies, notably dye sensitized solar cells and supported gold nanoparticle catalysts. Free standing nanotube ordered arrays were produced by anodization of titanium foil in non-aqueous solutions. For optical measurement purposes the arrays were flaked off the titanium substrate. Flakes as large as several square centimeters, with a thickness of 30-50  $\mu\text{m}$  were obtained, and coated either with N719 dye, or with gold nanoparticles (2-7nm). Both annealed (crystalline) and non-annealed (amorphous) samples were characterized by means of SEM and TEM imaging coupled with EDS and XRD spectroscopy. Subsequent optical measurements on gold decorated nanotubes offered insight on the gold-titania interaction, while measurements on both naked and dye coated tubes provided information on diffraction and thin film effects. These effects caused a significant wavelength dependent difference in the reflection spectrum depending on whether illumination was incident on the open or closed side of the tubes.

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