

# Photofuels and Photovoltaics: Application of Self-Assembled 1-D TiO<sub>2</sub> Architectures

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We consider the self-assembled synthesis and application to solar energy conversion of semiconducting n-type TiO<sub>2</sub> nanotube as well as nanowire arrays. Details of the specific architecture, crystallinity, composition and illumination geometry of the nanotube or nanowire arrays are critical factors in their performance. We discuss the key aspects relating to each factor and the advances achieved in improving each. Solar fuel applications include the photocatalytic reduction of CO<sub>2</sub> and water vapor to hydrocarbon fuels. We discuss several excitonic photovoltaic devices making use of the 1-D nanotube/wire morphology, including Förster-type resonance energy transfer (FRET)-based solid state dye sensitized solar cells.

## Biography

Craig A. Grimes received the Ph.D. degree in Electrical and Computer Engineering from the University of Texas at Austin in 1990. He is currently a Professor of Electrical Engineering, and Materials Science and Engineering, at the Pennsylvania State University, University Park. His research interests include excitonic solar cells, photocatalytic reduction of CO<sub>2</sub> to hydrocarbon fuels, solar production of hydrogen by water photoelectrolysis, propagation and control of electromagnetic energy, and remote query environmental sensors.

