

Title: Synthesis and Characterization of Ordered Dye-Functionalized Oxide Nanostructures for Photoelectrochemical Applications

Type: Student

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Description: This proposal focuses on the development and characterization of ordered titanium dioxide nanostructures with dye functionality for photoelectrochemical applications. Specifically, with our continuous collaboration with PNNL, this project aims to develop titania nanorods and ordered mesoporous films for the continuous development of photoelectrochemical solar cells for more efficient light conversion, energy production, and removal of the liquid electrolyte. Moreover, the proposed research emphasizes the enhancement of the fundamental understanding of physical properties and performance of nanostructured materials and devices. Our efforts are anticipated to result in (1) the further development and improvement of dye-functionalized titania nanorods for photoelectrochemical cells, (2) the potential growth of mesoporous films with pores unidirectionally-aligned and perpendicular to the substrate, (3) a better comprehensive understanding of the influences of ordered titania nanostructures on the device performance, and (4) the possible synthesis of other potential oxide nanostructures for various applications in nanoscience and nanotechnology, such as a wide spectrum of chemical and biological sensors. As a result, the proposed research will have a broad impact on nanoscience and nanotechnology, in addition to the direct impact on the development of photoelectrochemical solar cell devices, through joint efforts of UW and PNNL.