

Title: Growth Characterization of Dye-Functionalized Titania Nanostructures for Photoelectrochemical Applications

Type: Student

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Description: This proposal focuses on the development and characterization of dye-functionalized titania nanostructures for photoelectrochemical applications. Specifically, in collaboration with PNNL, this project aims to develop titanium dioxide nanorods and ordered Mesoporous films for the further development of photoelectrochemical cells for light conversion and energy production, and for the fundamental understanding of physical properties and performance of nanostructured materials and devices. The proposed research is anticipated to result in (1) development of dye-functionalized titania nanorods based photoelectrochemical cells, (2) a better understanding of the influences of nanostructures on the device performance, and (3) possible growth of Mesoporous films with pores unidirectionally aligned and perpendicular to the substrate for various applications in nanoscience and nanotechnology, including solar cells. For example, organically functionalized nanorods and ordered Mesoporous films can find a wide spectrum of applications such as chemical and biosensors. Unidirectionally aligned nanorods can be used as two-dimensional photonic bandgap crystals, and can also allow most conventional methods to be used to determine physical properties of nanoscaled materials. The proposed research will have a broad impact on nanoscience and nanotechnology, in addition to the direct impact on the development of solar cells, and thus will strengthen our collaboration between UW and PNNL, most likely leading to external funding.