

Structure and morphology control of multi-functional nanomaterials for high performance renewable energy devices

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Recent years have seen unprecedented motivation for the emergence of clean renewable energy sources. However, world dependence on traditional fuels will persist until alternate eco-friendly energy sources can compete economically. We must progress means to generate energy from renewable energy sources and then convert them to work as efficiently and cleanly as possible. Our research focuses on the synthesis, understanding and application of multi-functional nanomaterials, which include self-assembled copolymers, inorganic materials and nano-composites. Multi-functional nanomaterials have a wide variety of applications, for example, energy (Dye-Sensitized Solar cell, Polymer Electrolyte Membrane Fuel Cell, and Plasmonic Device) and environmental devices (Photo-Catalyst, Electro-Catalyst, and CO<sub>2</sub> Capture). Surface-modified nanomaterials may be used in photonic crystal (Bio/Chemical Sensor, and Light Harvesting Device) and optical devices (Anti-Fogging, Anti-Reflection, and Self-Cleaning).