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Synthesis & Characterization of Porphyrin Nanotubes/Rods for Solar Radiation Harvesting and Solar Cells

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<p>Porphyrins are macro-cycles often organized into nano-scale structures which perform many of the essential light-harvesting-, electron- and energy-transfer functions in various natural and synthetic systems. In addition to the sub-picosecond charge generation and transfer, they exhibit various shapes and functional properties that make them useful for the construction of ultrafast nanodevices and more specifically solar cells. This latter case would require to expand their specific J, S and Q absorption bands; a task of this research work. They are related to chlorophyll molecules found in natural systems that carry out light harvesting, charge separation and energy conversion. Using the free base and diacid forms of tetrakis (4-sulfonatophenyl) porphyrin and by varying the ionic strength of aqueous solutions used, Schwab et al were able to form single and bundled nanorods, whereas Wang et al used the mixture of tetrakis (4-sulfonatophenyl) porphyrin and Sn(IV) tetrakis(4-pyridyl) porphyrin to form a mixture of nanotubes and nanorods. Once synthesized, the incorporation of such nanostructures into a functional device presents its own set of unique problems, but one promising approach is to incorporate the nanotubes/rods onto a support to obtain an array that can be directly used as a device. Properties investigated after synthesis included the optical (UV-visible spectroscopy), physical (Transmission electron microscopy) and the growth mechanism of the nanotubes/rods. Understanding the sizes and growth mechanism of nanorods is essential for the successful implementation in PV-like solar cells hybrid systems.

Level (Hons, MSc,
   PhD, other)?

PhD

Consider for a student
   award (Yes / No)?

no

Would you like to
 submit a short paper
 for the Conference
 Proceedings (Yes / No)?

Yes

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