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**Studies on effect of temperature on synthesis of hierarchical TiO₂
nanostructures by surfactant free single step hydrothermal route
and its photoelectrochemical characterizations**

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Abstract:

Exotic hierarchical rutile TiO₂ nanostructures are synthesized by surfactant free single step hydrothermal route. The effect of reaction temperature, ranging from 140°C to 200°C on the properties of the synthesized rutile-TiO₂ is investigated. The synthesized rutile-TiO₂ nanostructures are characterized using X-Ray diffraction, X-Ray photoelectron spectroscopy, Raman spectroscopy, UV-Vis spectroscopy and Scanning electron microscopy techniques. The deposited TiO₂ samples are found to be photoelectrochemically active and the best photoelectrochemical performance (0.95 ± 0.05%) is obtained for the sample deposited at 180°C. A possible temperature dependent growth mechanism resulting in photochemically active TiO₂ nanostructure thin films is proposed.

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