

Effect of Seed Layer on Growth of Rutile TiO₂ Nanorods

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For achieving the high quality of titanium dioxide (TiO₂) nanorods, herein, we present a synthesis of rutile TiO₂ nanorods on a transparent conductive fluorine-doped tin oxide (FTO) glass substrate with seed layer by a two-step method. Anatase TiO₂ thin films were first precoated by spin coating and annealing, followed by the growth of rutile TiO₂ nanorods with a hydrothermal method. The crystallographic nanostructures and properties of the nanorods were investigated. XRD results demonstrate that seed layer was tetragonal anatase TiO₂ structure while nanorods had tetragonal rutile TiO₂ structure. Since the hydrothermal technique was conducted in medium acid, structure of nanorods was induced to form in rutile phase. The major characteristic orientation of nanorods on the seed layers was [002] and minor in (101) planes. FE-SEM results show that seed layer enhances the process to achieve vertical-aligned orientation of the TiO₂ nanorods, which contribute to develop electron transport rate and could play an important role in electron transport layer in high-performance Perovskite solar cell.

Primary author: PRATHAN, Aschariya (Department of Physics and Materials Science, Faculty of Science, Chiang Mai University)

Co-author: Prof. WONGRATANAPHISAN, Duangmanee

Presenter: PRATHAN, Aschariya (Department of Physics and Materials Science, Faculty of Science, Chiang Mai University)

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