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Photo-Induced Reversible Surface Wettability Analysis of GLAD Synthesized In2O3/TiO2 Heterostructure Nanocolumn

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Abstract : A novel vertical 1D In2O3/TiO2 nanocolumn (NC) axial heterostructure has been successfully synthesized using Glancing Angle Deposition (GLAD) technique inside E-Beam Evaporator chamber. Field emission scanning electron microscope (FESEM) has been used to evaluate the morphology of the structure grown. The estimated length of In2O3/TiO2 NC is ~250 nm and ~300nm for In2O3 and TiO2 respectively with diameter ~60-90 nm. The surface of the heterostructure is porous in nature which can affect the interfacial wettability properties. The grown structure has been further characterized using X-ray Diffraction (XRD) and UV-Visible absorption measurement. The polycrystalline nature of the sample has been examined using XRD with prominent peaks obtained with phase (101) for anatase TiO2 and (211) for In2O3. Here, 1D axial heterostructure NC thus favors efficient segregation of photo-excited carriers due to their type II band alignment between the constituent materials. Moreover, the 1D nanostructure is known for their large surface area and excellent ionic charge transport property. On exposure to UV light illumination, the surface properties of In2O3/TiO2 NC changes whereby the hydrophobic nature of the heterostructure changes to hydrophilic. As a result, the reversible surface wettability of heterostructure on interaction with UV light can give potential applications as antifogging and self-cleaning surfaces.

Keywords : GLAD, heterostructure, In2O3/TiO2 NC, surface wettability
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