Development of bismuth halides and bismuth oxyhalides (BiOI/BiI₃) with contemporary design appears to be proficient inputs in semiconductor research for advance photo-catalytic and photovoltaic applications. A simple and facile solution based synthesis of BiOI, BiI₃ at room temperature in ambient conditions resulted with well-defined layered structures. The X-ray diffraction analysis of final product synthesized with varying concentrations of Bi³⁺ and I⁻ revealed transformation of phase from BiOI to BiI₃. The desirable phase and morphology of BiI₃ or BiOI or mixture of both the phase can be obtained by controlling the reaction conditions. The 2D square sheets of BiOI were formed in solution due to the columbic attractions between anions (I⁻) and cations (Bi₂O₂)²⁺ present in acidic medium with (001) and (110) facets. The tuning of layer like structures from sheet to hexagon was achieved by varying concentration. In the intermediate state, the growth of BiI₃ hexagonal plates on the surface of BiOI square sheet was observed from FESEM images. Pure BiI₃ shows large number of 2-D growth of hexagonal plates. BiI₃, BiOI, and BiOI-BiI₃ phases are identified and analyzed by XRD and FESEM and found to have good optical response which established the potential application of these materials in photovoltaics devices.

(1) Jie Li, YingYu and Lizhi Zhang. (2014). Nanoscale. 6, 8473.

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