

Wet chemical synthesis of MoSe₂/WSe₂ heterostructure황윤정, 신내철†

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Fabrication of two-dimensional (2D) heterostructure of transition metal dichalcogenides (TMDs) promises a range of opportunities to broaden the physical properties of 2D semiconductor materials. Especially, the lateral heterostructures where two different atomic monolayers are connected in-plane could exhibit tunable optoelectronic properties. Here we show the formation of such heterostructure of TMDs, here MoSe₂/WSe₂, is also possible with wet chemical synthesis by controlling the delivery of precursors during the crystal growth. We confirm the growth morphology of the heterostructure is strongly dependent on the temperature ramping rate and the secondary precursor injection. The effect of the reaction medium other than oleic acid on the heterostructure morphology – vertical vs lateral is also discussed. We propose a simple mechanism showing the favorable nucleation sites for the heterostructure formation via interaction between precursor mixtures. Our results suggest new methods to create TMDs heterostructures and highlight the importance of ligand chemistry governing the colloidal synthesis of semiconducting TMDs structures.