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(G*) Growth of spirocyclic nanorods in a biphasic system

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The growth of nanomaterials in a biphasic system is an intriguing physical diffusion process where two immiscible, or partially miscible, phases are used to disperse two distinct precursors that merge at the interface, leading to the directional growth of crystals. In our method for the synthesis of spirocyclic nanorods, an aqueous phase (containing hydroxylated molybdenum disulfide nanosheets and thioglycolic acid) is interfaced with a butanol phase containing ninhydrin. The diffusion of these two phases one into another creates a system where the synthesis of spirocyclic nanorods occurs. Using advanced imaging techniques such as electron and atomic force microscopy, we show that this process allows for the controlled synthesis of nanorods with specific length and diameter depending on the concentration of precursors and diffusion-promoting additives, thus making it a promising approach for nanomaterial growth applications. Surface chemical features were examined using FTIR, UV-visible spectroscopy, Raman spectroscopy, X-ray photon spectroscopy (XPS), and Atomic Force Microscopy (AFM). Our method for growing spirocyclic organic nanorods was applied to fabricate nanorod sensors capable to the detection of a variety of proteinogenic amino acids, pointing at the unique physico-chemical properties of our system.

Keyword-1

Nanomaterials

Keyword-2

Biphasic systems

Keyword-3

Crystal growth

Authors: Ms IDRIS, Munirat A. (University of Western Ontario); Mr COLE-ANDRE', Maxximuss (University of Western Ontario); STOCEK, Noah (University of Western Ontario); FANCHINI, Giovanni

Presenter: Ms IDRIS, Munirat A. (University of Western Ontario)

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