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Influence of Solvent Molecular Geometry on the Growth of Nanostructures

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Abstract

The high aspect ratio of nanostructures such as nanorods have been exploited for long to enhance the analytical performance of devices. However, despite over 150 years of metal colloids studies, it is still a challenge to obtain nanorods with controlled aspect ratios tailored for specific applications.The involvement of solvent on the growth kinetics have been studied extensively in terms of surface tension, dielectric constant, pH, and viscosity. Yet, none of these studies have ever focused on studying the role of solvent molecular geometry on the aspect ratio of ZnO nanorods. Herein, I would like to give the first demonstration of how the solvent (water and ethanol) molecular geometry could be exploited to control the growth mechanism of nanostructures. The key features which will be focused in the presentation includes:

The insightful discussion about the behaviour of solvent molecular geometry in three dimensional hexagonal wurtzite crystal system of ZnO and formulation of a theory on designing and predicting nanostructures of desired morphology by selecting solvent of a precise molecular geometry and carbon chain length. Besides, how carbon chain length could act as a limiting factor for the stacking of ZnO monomer along a, b or c-axis of the wurtzite crystal system and turning the morphology of nanorods into needle-like structure.

The proposed growth mechanism theory showed a good agreement with previously reported ZnO nanorods whichsuggest a substantial improvement in terms of predicting and designing different morphologies simply by selecting a solvent with a specific molecular geometry and of a precise carbon chain length.

Biography

Ammara Ejaz had her PhD from Chonnam National University, Gwangju, South Korea In 2018 and also a research professor in 2019. She is currently Research Assistant at School of Engineering, University of Glasgow, Glasgow, United Kingdom. She has been a reviewer to so many international Journals. Her research interest includes Material Chemistry, Nitrogen doping, Nanoparticles growth kinetics, Sensors, Fuel cells, Biopolymers and Green composites. She has publications in many reputable international Journals.

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