

## **ABSTRACT:**

### **Functional Nanomaterials from Precursors: Synthesis, Characterisation and Energy Applications**

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Nanoscale materials have long promised to revolutionize science and technology. The fascinating properties realised when materials dimensions shrink all the way down to a few hundreds/thousands of atoms have bedazzled scientists for the past few decades. The use of these functional materials in technological applications is still in it's infancy with exponential growth expected within the next few years. These applications have encompassed fields as disparate as medicine, biology, energy conversion and storage, catalysis, sensing, nanocomposite engineering, cosmetics, to cite the most popular ones. While great strides have been made in the synthesis of nanomaterials on lab scale, the ability to scale up the production has still not reached maturity. There are numerous methods used to prepare nanomaterials, which fall into various categories. This lecture will highlight the hot-injection precursor route and solventless melt method, both using single molecular precursors. Examples include nickel sulfide and phosphide-based materials for applications in HER, OER and supercapacitance. Examples of 2-D materials will also be presented. The challenges and intricacy of preparation will also be discussed. The lecture will highlight sub themes such as green chemistry, shape control, phase purity and energy applications of the materials.