

Nanostructured Materials for energy conversion and storage

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Abstract

Energy security is among the highest concerns for future living in this planet; therefore, securing it from renewable sources such as solar and biomass are of extreme importance. One of the most viable way to secure renewable energy is to convert them into electrical energy or as fuel. Furthermore, emergence of high performing electronics and electric vehicles demand electrical energy storage devices with high storage and power capabilities. Conventional nanoparticles although offer high surface area for superior performance their adverse surface effects determining stability and electrical properties are a bottleneck to exploit the full potential of nanomaterials. Non-conventional nano-morphologies such as wires, tubes, flowers, sheets, and many hierarchical structures overcome those drawbacks and offer numerous opportunities to be ideal candidates for energy conversion and storage. However, most of those promising nanostructures are yet to be scaled up for large scale production and efforts along this direction is currently underway while keeping up the pace to develop new nanostructures. This lecture would provide an overview of the developments on the non-conventional morphologies and outlook for future developments.