

Nanomaterials for Green Energy Harvesting and Storage

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We all know that burning fossil fuels is an unsustainable way of satisfying our ever increasing energy needs. The recent dramatic events taking place in Japan show (again) that nuclear technology is not safe and that we must improve our ability to harvest and store energy from other sources, in particular the sun. However, solar energy is presently too expensive to compete efficiently not only with fossil fuels, but also with nuclear energy.

In order to decrease costs, we need both to decrease the amount of active materials (*e.g.*, Si) and increase the efficiency of solar cells. This can be accomplished by the use of nanomaterials, particularly those based on silicon, the second most abundant element on Earth. In this talk we will first review various approaches to solar cell fabrication based on semiconductor nanostructures, such as nanowires as well as nanoparticles and highlight the various challenges that lie ahead of us concerning the use of such nanomaterials.

Another longstanding problem concerns energy storage, since there is no sun at night and the wind is an intermittent (and often unpredictable) energy source. We will present some recent progress in batteries, particularly lithium-ion batteries which are presently the most efficient ones, exhibiting the highest storage capacity. Here again, the impact of nanomaterials (some Si-based as well) will be presented, as they can play a significant role in the future of energy storage devices.