Nanoscience, Advanced Functional Materials, and Clean Energy

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The energy intensive developments happening around the world are constantly driving the pollution levels far above any reasonable or acceptable limits. Therefore a dramatic reduction in our dependence on polluting fuels is an absolute must for a better and greener tomorrow. This realization has fuelled intense research on developing new functional materials with novel functionalities for applications in the areas of renewable energy harvesting, storage and conservation. Most scientific solutions in these domains must necessarily ride upon the promise of materials innovation involving a variety of materials systems, and their compositions, morphologies and architectures. Nanomaterials, in particular, offer several novel and interesting options in this regard. In this talk, I will briefly outline this scenario by presenting a range of interesting possibilities in this respect with several examples based on the recent research done in my group including the work done with industry. The topics will include work on the new hybrid perovskites, photoelectrochemical water splitting, CO_2 reduction, and energy storage devices using metal oxide/sulphide nanomaterials and different functional forms of carbon.

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