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Exceptional Properties of Hierarchical Oxide Nanostructures for Energy and Medicine

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Among the areas requiring rapid transformations to meet the demands of future world, energy and medicine are in the forefront. While the problems associated with the present energy system and delays in developing alternative routes are major concerns in the energy sector, emergence of new lethal diseases and increasing health care costs bring unprecedented challenges to the medical community. Both these areas need the development of revolutionary materials, semiconductors in particular, to address the current and emerging issues. Low dimensional hierarchical structures have the potentials to solve outstanding challenges in energy production/conversion and medical diagnosis and treatment; however, cost and scalability issues hamper the commercialization prospects of many such materials and technologies. Anodic oxidation is a low cost scalable technique to grow hierarchical nanostructures of metal oxides. This more than a century old technique gained significant attention in the recent years due to the exceptional properties of the ordered low dimensional structures yielded by it. In this presentation, the unique properties of semiconducting metal oxides grown by this technique will be reviewed in the context of their applications in renewable energy conversion and diagnosis and treatment of diseases

Biography

Oomman K. Varghese received Ph.D. from Indian Institute of Technology Delhi (IITD), India. He conducted postdoctoral research in the University of Kentucky and the Pennsylvania State University and then worked as a Process Development Engineer in First Solar, USA. He is currently an Associate Professor in the Department of Physics, University of Houston (UH), Texas. His group's research is primarily aimed at developing nanoscale materials and heterostructures and investigating their unique properties for solar energy conversion and medical applications. He has contributed to over 100 peer reviewed articles, one book, two book chapters and three patents. His publications have received over 36,000 citations (Google Scholar h-index - 74). In 2011, Thomson Reuters ranked him 9th among 'World's Top 100 Materials Scientists' in the past decade. In 2014, 2015 and 2016 he received the title 'Highly Cited Researcher' and had his name listed in Thomson Reuters' World's Most Influential Scientific Minds. He is a recipient of the UH College of Natural Science and Mathematics John C. Butler Award for Excellence in Teaching. He is among the top 2% of the scientists in the world per the Stanford University Report, 2020."

KEYNOTE SPEAKER