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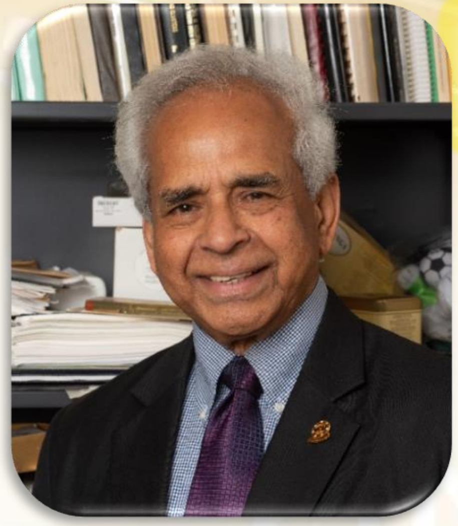
Webinar #20



Prof. Puru Jena

Department of Physics, Virginia Commonwealth University, Richmond, VA, USA

Title: Introduction to Superatomic Chemistry and Superatom-based Materials

Registration link: https://tinyurl.com/2p8az7bh

**Zoom details will be shared with the registered participants*

29 August 2023, 5.30 – 7.00 pm Indian Standard Time

Short biography

Prof. Puru Jena is a Distinguished Professor of Physics and Founding Director of the Institute for Sustainable Energy and Environment at Virginia Commonwealth University,. He received his Ph. D. in Physics from the University of California at Riverside. He also served as Program Director at the National Science Foundation and as Jefferson Science Fellow and Senior Science Advisor at the US Department of State. Dr. Jena's research covers a wide range of topics in nano-structured materials, condensed matter Physics, chemistry, and materials Science. He is the author of more than 650 papers including 14 edited books, with Google citations and H index at 35,000 and 93, respectively. His many honors include Member of the National Academy of Inventors, Professor A. K. Chandra Memorial Award from the Indian Chemical Society, Fellow of the American Physical Society, Outstanding Scientist of Virginia, Outstanding Faculty of Virginia, Presidential Medallion, University Award of Excellence and Outstanding Scholar from Virginia Commonwealth University. He has served as a member of numerous scientific panels at the National Academy of Sciences, National Science Foundation, Department of Energy, and Army Research Office. He was a member of the Presidential Commission on bilateral scientific collaboration between USA and Russia.

Abstract

The periodic table of elements developed by Medeleev in 1869 has limitations; the number of elements and their chemistry are fixed and some elements are either expensive or scarce. Alchemists have tried for centuries to alter the chemistry of elements without success, for example changing base metals into gold. Nanostructures provide a means of achieving some of the Alchemists' dream, as matter in nanometer length scale behaves differently than it does in the bulk phase. Superatoms are atomic clusters with tailored size and composition that mimic the chemistry of atoms in the periodic table, but with superior properties. Because of their specific size, composition, and non-spherical geometry, superatoms not only promote unusual reactions but also serve as the building blocks of a new class of cluster assembled materials with properties very different from conventional materials. This talk will provide the design principles of these superatoms and illustrate their unique role in the chemical and material sciences by focusing on superalkalis and superhalogens that behave like alkali and halogen atoms, respectively. However, the electron affinities of the superhalogens, which can be designed and synthesized without using even a single halogen atom, are larger than those of halogens. Similarly, the ionization potentials of superalkalis are smaller than those of alkali atoms. These superatoms can be used to fundamentally change our understanding of chemistry and physics; for example, noble gas atoms can form chemical bonds at room temperature, zinc can assume an oxidation state of +3, like charges can attract, etc. The superatoms can also serve as building blocks for advanced electrides, water-resistant materials for solar cells, halogen-free electrolytes for solid-state batteries, and multiferroic materials.

Panelist

Prof. Dr. Duc Nguyen Manh

Culham Centre for Fusion Energy, United Kingdom Atomic Energy Authority, United Kingdom

Convener:
Prof. Yoshiyuki Kawazoe
Head, ACCMS-GRC
SRMIST, KTR

Organizers:
Dr. V.J.Surya & Dr.S. Yuvaraj
ACCMS-GRC Center-in-Charges
Dept. of Physics and Nanotechnology, SRMIST, KTR

NAAC	UGC	NIRF	QS	THE World University Rankings	ARIIA	Shanghai Ranking
A++	Category I with 12B Status	(2022) Ranked 19th University	(2023) World Ranking one among 41 Indian Universities	(2023) World Ranking one among 75 Indian Universities	(2021) Ranked 4th	(2023) World Ranking one among 14 Indian Universities