

Nanobiotechnology: A Different Perspective

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Wednesday, April 9 ■ 3:30-4:30 p.m.

Burton Morgan Center, Room 121

Reception following seminar

The study of the synthesis, exotic properties, assembly/packaging and potential commercial application of nanomaterials is an extremely important topic of research that is expected to have far-reaching global impact. The focus of my talk will be on an emerging branch of nanotechnology that derives its inspiration from biology. Recognizing that some of the most exquisite and highly functional nanomaterials are grown by biological systems (examples include silica by diatoms and magnetic nanoparticles by magnetotactic bacteria [1]). Many researchers have focused attention on understanding how inorganic materials are made biological systems and attempting to replicate such processes in the lab. In my laboratory, we investigated the use of plant organisms such as fungi in the synthesis of nanomaterials over a range of chemical compositions that include materials [2], metal sulfides [3], and oxides [4]. An exciting development is the use of plant extracts in nanoparticle synthesis [5] wherein large concentrations of gold nanotriangles have been obtained that have potential application in cancer hyperthermia. Organisms such as fungi are not normally exposed to metal precursor stresses such that they should be capable of a broad range of biochemical transformations to negate these stresses is useful in materials chemistry, and throws up exciting possibilities. Recently, we have also shown that bacteria may be "trained" to synthesize magnetite when challenged with suitable iron complexes under aerobic conditions [6].

References:

- [1] Sarikaya, M. Proc. Natl. Acad. Sci. USA, 1999, 96, 14183.
- [2] Mukherjee, P et al., Angew. Chem. 2001, 40, 3585.
- [3] Ahmed, A. et al., J. Am. Chem. Soc, 2002, 124, 12108.
- [4] Bansal et al., Adv. Mater. 2005, 17 889 ; Bharde et al., Small 2006, 2 135.
- [5] Shankar, S.S. et al., Nature materials 2004, 3, 482.
- [6] Bharde et al., J. Am. Chem. Soc. 2005, 127, 9326.

BIO:

Dr Murali Sastry, Chief Scientist at the Tata Chemicals Innovation Centre, Pune, India, has an MSc in Physics and a PhD (in thin film technology) from the prestigious Indian Institute of Technology (IIT) Madras (now Chennai, 1987). He was a postdoctoral fellow at the International Centre for Theoretical Physics at Trieste, Italy (1988-1991); visiting faculty at CNRS in Orsay, France (2001-2003) and at the University of Maryland at College Park, USA (1998-99); as well as a federation fellow at RMIT, Melbourne (2006) and DAE professor at Central University, Hyderabad (2006).

Counted among the world's top 15 nanobiotechnologists, Dr Sastry has close to 25 years of research experience. A true interdisciplinary scientist, he joined Tata Chemicals in 2005, after creating a centre for nanotechnology at the renowned National Chemical Laboratory (NCL), Pune. Having authored over 300 international publications, 10 chapters in books and 15 Indian and US patents, he has a number of national and international awards to his credit including India's most prestigious award in science, the Shanti Swarup Bhatnagar Prize in Chemistry (2003).

Editor (Nanomaterials) for the Materials Research Bulletin (Elsevier), Dr Sastry serves on the international advisory boards of seven leading chemistry journals, having earlier served on advisory boards for the Department of Biotechnology, the Department of Science and Technology, the Presidential Nanotechnology Committee and the Council of Scientific and Industrial Research (CSIR), Government of India. Dr Sastry's current research interests include interfacing biologicals with inorganic nanomaterials, understanding biological process in their nanodimensions, developing new industrially relevant renewable materials and green processes, as well as ethical issues in application of nanomaterials

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