



**PONDICHERRY UNIVERSITY**  
**School of Physical, Chemical & Applied Sciences**  
**Department of Physics**

**Invited Lecture**

**On**

**Growth and Form: Some Insights into Mechanisms of Nucleation, Growth  
and Patterning of Nanostructures**

**By**

**Prof. N. RAVISHANKAR**  
Materials Research Centre  
Indian Institute of Science  
Bangalore 560012

**Date:** 18<sup>th</sup> October 2013.

**Time:** 3.30 PM

**Venue:** Raman Seminar Hall, Dept. of Physics.

**All are invited**

  
10/10/2013

**Head of the Department of Physics**

**Dr.G.CHANDRASEKARAN**  
PROFESSOR & HEAD  
DEPARTMENT OF PHYSICS  
PONDICHERRY UNIVERSITY

## **On Growth and Form: Some Insights into Mechanisms of Nucleation, Growth and Patterning of Nanostructures**

**Prof. N. Ravishankar**

Materials Research Centre  
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Nucleation and growth processes play a key role in controlling the structure, microstructure and chemistry and consequently every conceivable property in advanced functional materials. Our group has been working on wet chemical methods for the synthesis of nanostructures and hybrids. While these methods are undoubtedly very powerful, the mechanisms of nucleation and growth are poorly understood. In particular, there is an over-emphasis on the role of specific reagents rather than broad principles that are applicable for a wide variety of systems.

My talk will focus on three specific issues. In the first part, I will discuss some general principles of morphology evolution during wet chemical synthesis. In particular, the formation of anisotropic structures of high symmetry materials and the associated symmetry breaking mechanisms will be discussed. Specific examples include the growth of ultrathin single crystalline Au nanowires and the formation of plate-shaped structures. I will present some of the newer results on the intriguing structure and properties of the ultrathin metal nanowires.

In the second part, I will discuss a general method for the synthesis of nanoporous materials and discuss some of their applications. Some unexpected and interesting results on the stability of these nanoporous systems will be presented.

In the third part, I will discuss about the role of heterogeneous nucleation for controlled synthesis of nanoscale hybrids and nanopatterning for a variety of applications including catalysis and photovoltaics.

The overall emphasis will be on illustrating general principles that we have been able to extract based on our research over the past few years and also some thoughts on future directions and applications.