Monica Olvera de la Cruz: Brief Profile

Monica Olvera de la Cruz obtained her B.A. in Physics from the UNAM, Mexico, in 1981, and her Ph.D. in Physics from Cambridge University, UK, in 1985. She joined Northwestern University in 1986, where she is the Lawyer Taylor Professor of Materials Science & Engineering, Professor of Chemistry, Professor of Physic and Astronomy and Professor of Chemical & Biological Engineering. She is the Director of the Center for Computation and Theory of Soft Materials. From 1995-97 she was a Staff Scientist in the Commissariat a l'Energie Atomique, Saclay, France, where she also held visiting scientist positions in 1993 and in 2003. She has developed theoretical models to determine the thermodynamics, statistics and dynamics of macromolecules in complex environments including multicomponent solutions of heterogeneous synthetic and biological molecules, and molecular electrolytes.

She is a member of the National Academy of Sciences (NAS), the American Academy of Arts and Sciences and a Fellow of the American Physical Society (APS). She was awarded the 2017 APS Polymer Physics Prize, a National Security Science and Engineering Faculty Fellowship (DoD), the 2007 Cozzarelli Prize (NAS), the Presidential Young Investigator Award (NSF), the Alfred P. Sloan Fellowship, and the David and Lucile Packard Fellowship in Science and Engineering. She is a member of the US Department of Energy's Basic Energy Sciences Advisory Committee and a Senior Editor for the ACS Central Science.

BOSE-125 Distinguished Lecture

on

THIRD JANUARY
2018

सत्येन्द्र नाथ बसु की 125 वीं जयंती

1894 - 2018

125th Birth Anniversary of Satyendra Nath Bose

सत्येन्द्र नाथ बसु राष्ट्रीय मौलिक विज्ञान केन्द्र

Satyendra Nath Bose National Centre for Basic Sciences

Controlling Nanoparticle Assembly

Monica Olvera de la Cruz

ABSTRACT

The controlled assembly of nanoscale building blocks, such as metallic nanoparticles and proteins, has led to materials with unique properties. Directed crystallization using DNA hybridization, in particular, has been used to design materials with a broad range of crystal symmetries. DNA chains grafted to the building blocks link neighboring units via DNA hybridization, which we demonstrate is a kinetic and cooperative process that can be used to design different equilibrium crystal symmetries. By carefully selecting the DNA length, the salt concentration and the grafting density we find symmetries found for both atomic and colloidal crystals as well as new symmetries. Our scale-accurate model with explicit DNA hybridization and ions provides the design parameters to achieve defect-free single crystals with macroscopic anisotropic properties, and describes transitions driven by changes in ionic strength. Simulations using a properly coarse-grained model reproduce both the shape of single crystals and their growth kinetics.

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by

Monica Olvera de la Cruz
Lawyer Taylor Professor, Northwestern University

on

3rd January , 2018 at 5.00 pm

to celebrate

125th Birth Anniversary of Professor Satyendra Nath Bose

Prof. Samit Kumar Ray
Director

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