

**Symposium on Undergraduate Nano-Education:  
"Addressing the Challenges of Nanoscale Science & Engineering Education"**

**Presentation:** "Preparing future generations to address global challenges through nanotechnology."

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**Presenter Biography:** NCLT Director, R.P.H. Chang received his B.S. degree in Physics from the Massachusetts Institute of Technology and his Ph.D in Astrophysics from Princeton University. He spent 15 years performing research at Bell Laboratories before joining Northwestern in 1986 as Professor of Materials Science and Engineering and Professor of Electrical and Computer Engineering.

Throughout his career, Chang has emphasized the integration of research and education. He launched the nation's first NSF-funded Research Experiences for Teachers (RET) program, which the NSF subsequently adopted as a foundation-wide program for teacher professional development. His groundbreaking Materials World Modules –inquiry-and-design based modules for middle and high school students have reached tens of thousands of students in the US and Mexico. In 2004, he launched NCLT - the nation's first nanotechnology education center. In 2005 he received the NSF Director's Distinguished Teaching Scholar Award for his unique contributions to interdisciplinary research and education.

In service to the global community, Chang has helped to establish a Materials World Network and a Global Nanotechnology Network as well as numerous programs that prepare young US researchers to collaborate effectively with global partners and solve global challenges.

**Abstract:**

What are some of the global challenges facing us thirty years from now? It has been predicted that: there will be a big increase in population; oil production will peak then drop rapidly; climate change will increase the number of natural disasters around the world; shortages of water and food supplies will affect many parts of the world. In this talk we give an overview of how NCLT is preparing US students to address these global challenges through nanotechnology.

The NCLT was established in 2004 by the National Science Foundation with a mission to build US capacity in NSE education; enhance national STEM education; and help to meet the human resource development goals of the National Nanotechnology Initiative. The Center consists of world-class nano researchers and education experts and their students, working to quickly transfer the latest NSE research to US classrooms in grades 7-16.

The Center's unique program integrates learning and teaching research, instructional material development, professional development, and community building. Our methodology incorporates the principles of inquiry and design, working partnerships with teachers and administrators, and cascade learning (i.e., encouraging students to gain a deeper understanding of concepts by teaching them to others.) The NCLT website offers a variety of resources for teachers, students, and faculty including courses, lectures, pre-college classroom modules, and learning technologies such as visualizations, simulations, animations, and games. A series of integrated instructional units incorporating these elements is now under development.