

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

Presentation: Bringing Research into the Classroom: Integrating Nanoscience Concepts, Techniques, and Skills in the undergraduate curriculum

A.-R. Mayol, M. Gomez, C. Marin, R. Palai, A. Biaggi, J. Ramos, J. Morales, M. M. Maldonado
University of Puerto Rico, Institute for Functional Nanomaterials (IFN), San Juan, PR 00931

Presenter Biography:

Ana-Rita Mayol is an Assistant Professor in the Department of Chemistry at the University of Puerto Rico – Rio Piedras Campus. She received her M.S. and Ph.D. degree in Organometallic Chemistry from Cornell University in 2000. Mayol completed a postdoctoral appointment in Food Chemistry at Cornell University, under the supervision of Dr. Terry Acree, and a Research and Development appointment at Consorzio di Ricerca Lattiero Caseario (CorFiLaC), in Sicily, Italy. Mayol has been an active researcher in Chemical Education since August 2001 in the Department of Chemistry where she has done work in module development, implementation and assessment in the areas on Organic, NanoScience and Physical Chemistry. Mayol is developing innovative laboratory experiences for advanced undergraduate courses and the final goal is to develop a Nanoscience curriculum. Since June 2007, she is the Education and Outreach Director of the Institute of Functional Nanomaterials (IFN), where she has build a strong Education and Outreach Program reaching more than 1000 persons at all levels. She also directs the Education and Outreach Program of NASA: Center for Advanced Nanoscale Materials. She is also the Project Director of the NSF funded projects PR-AGEP and a G K-12 Program: "From Hectares to Nanometers: GK-12 Multidisciplinary Explorations of Tropical Ecosystems and Functional Nanoscience".

Mayol was the Academic Coordinator for the Department of Chemistry from July 2002 to January 2005 and the Assistant Dean of Student Affairs in the College of Natural Sciences from August 2007 to May 2008.

Abstract:

The interdisciplinary nature of nanoscience brings the opportunity of designing educational materials that expose students at all levels to different disciplines while exposing them to current research results, concepts, and skills. Nanoscience research uses specialized equipment and techniques that most teaching laboratories at the undergraduate level do not have available due to lack of resources or people prepared to teach these techniques. The teaching laboratories typically lack modern infrastructure, modern equipment and innovative experiments that promote problem solving skills and shows new applications. By replacing outdated experiments in the established curriculum with experimental activities in nanoscience and technology the laboratory courses will be brought into the 21st Century. The goal of this project is to develop new laboratory experiences that allow undergraduate students at all levels to learn the basics of nanoscience and use modern equipment. The development of new curricular materials that employ the new approaches and tools will vividly show and explore the fundamentals of science and will familiarize students with modern research topics and techniques. This work will present laboratory experiences developed for Physical Chemistry and Modern Physics that have been developed using the "Big Ideas" identified by NCTL as a guide, to ensure that the basic concepts in nanoscience aligned with the course curriculum are covered. This project has catalyzed the development of four new laboratory experiences and has fostered two new collaborations with Cornell University and University of Buffalo to implement materials already developed at this level. In addition, new laboratory experiences are being developed for the introductory course General Chemistry and Physics, also taking advantage of the aforementioned collaborations. Dissemination of these materials will be done via the IFN website and collaborators' web-based libraries.