

## Conférence - CEISAM - UMR CNRS 6230

Mercredi 18 Juin 2014  
09h30 - Salle Marie Curie

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### “Artificial Photosynthesis, Biosensors, and Drug Delivery Using Layered Structured Nanomaterials”

**Abstract:** We are studying new applications of layered inorganic nanomaterials such as the zirconium phosphates (ZrP). The  $\theta$  phase of ZrP can be directly ion-exchanged with large metal complexes, producing intercalated phases useful for artificial photosynthesis schemes, water decontamination, amperometric biosensors, and vapochromic materials' applications. Recently, we have demonstrated that the hormone insulin and the anticancer drugs cisplatin and doxorubicin, as well as several metallocenes, can be intercalated in ZrP. The intercalation reaction results in nanoparticles with an expanded interlayer distance. UV-vis spectrophotometry, XPS and  $^{31}\text{P}$ -NMR spectroscopies, and molecular modeling studies indicate that for cisplatin the drug's chloride ligands have been substituted by phosphate groups of the ZrP material. Results of in-vitro drug release as well as cytotoxicity studies with breast-cancer cell lines for both anticancer agents indicate that the use of these materials for cancer treatment could prove to represent a new strategy for nanotherapeutics. Nanoparticles of these materials can specifically target tumor cells by the Enhanced Permeability and Retention Effect. We have recently intercalated neurological agents: carbamazepine and dopamine.

**Biography:** Jorge Colón received his Ph.D. degree from Texas A&M University. After postdoctoral positions at Texas A&M University and Caltech, he joined the Department of Chemistry of the University of Puerto Rico at Río Piedras in 1992, where he is currently a full professor. His research interests are in the area of layered materials with applications in artificial photosynthesis, biosensors, and drug delivery. He has won the NSF Postdoctoral Fellowship (1990-92), NSF Young Investigator Award (1993), Igaravidez Award of the ACS-Puerto Rico Section (2008), and the Education Award of the ACS-Puerto Rico Section (2009). He served as President of the Caribbean Division of the American Association for the Advancement of Science (2007-2009), the Puerto Rico Section of the ACS (2007, and as treasurer in 1995 and 2004-present), and the Puerto Rico Association of University Professors (1999, and Vicepresident of the Río Piedras Campus Chapter from 2010-2012).

