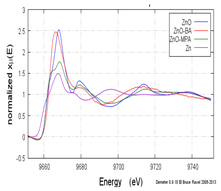
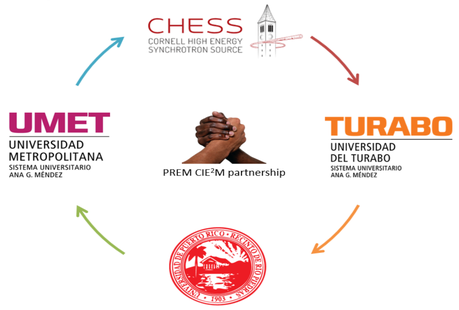
Center for Interfacial Electrochemistry of Energy Materials (NSF-PREM Grant Number 1827622)

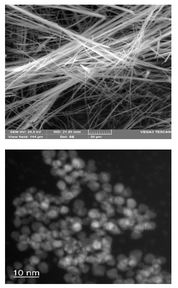
Lymari Fuentes-Claudio[1], Vilmalí López-Mejías[2], Lisandro Cunci[3], Mitk'El Santiago[1], Carlos R. Cabrera[2], Jorge L. Colon[2], Ratnakar Palai[2] ; [1]U. Metropolitana, [2]UPR-Rio Piedras, [3]U. Turabo

What is the NSF-PREM-CiE²M?

The NSF-PREM CIE²M rests on the partnership of four institutions that complete the PREM pathway, Universidad Metropolitana and Universidad del Turabo, the University of Puerto Rico, Río Piedras Campus, all Hispanic-Serving Institutions, and the Cornell High Energy Synchrotron Source (CHESS) at Cornell University, a Division of Materials Research funded center.

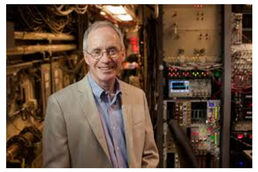






Mission

The Center brings together a diverse and talented scientific community with experience and expertise in electrochemistry, solid-state chemistry, inorganic chemistry, and synchrotron-based techniques for characterization of energy materials *in operando* conditions at CHESS. The partnership will help develop a fundamental understanding of charge transfer mechanisms and electrochemical processes across surfaces, sub-surfaces, and interfaces in nanostructured materials. And will motivate and prepare undergraduate and graduate students to pursue interdisciplinary careers using synchrotron-based techniques.



Dr. Joel D. Brock, Director of CHESS and co-Director of PREM-CiE²M.

Cornell High Energy Synchrotron Source, CHESS.

From left to right: (front) Dr. Lymari Fuentes-Claudio, Dr. Vilmalí López-Mejías, and Dr. Lisandro Cunci; (back) Dr. Mitk'El Santiago, Dr. Carlos R. Cabrera, Dr. Jorge L. Colon, and Dr. Ratnakar Palai

NSF PREM-CiE²M Partnership Goals

Goals

To enhance the participant's research capacity, scientific productivity, and training in the field of materials characterization using synchrotron-based techniques

To promote recruitment, retention, and degree attainment of minority students involved in STEM fields

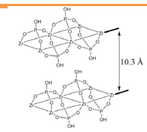
To increase the number of Hispanic users at CHESS by providing opportunities to expose students and postdocs to the utilization of synchrotron-based techniques

To increase our understanding of interfacial electrochemistry and to develop new energy technologies

NSF PREM-CiE²M Research Areas

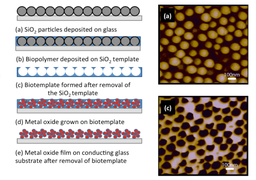
- **IRG1. Nanostructured Catalyst Materials.**

IRG1 Leader: C. Cabrera **Participants:** L. Cunci, J. Colón, M. Santiago
CHESS and Cornell University Collaborators: H. D. Abruña, J. D. Brock, K. D. Finkelstein, R. Huang, L. Kourkoutis, and D. M. Smilgies.



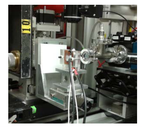
- **IRG2. Nanostructured Materials for Dye-Sensitized Solar Cells.**

IRG2 Leader: M. Santiago **Participants:** C. Cabrera, V. López-Mejías, J. Colón, L. Fuentes, R. Palai **CHESS and Cornell University Collaborators:** H. D. Abruña, J. D. Brock, T. Hanrath, R. Huang, K. D. Finkelstein, R. Huang, D. Kourkoutis, and D. M. Smilgies.



- **IRG3. Hybrid Solid-State Supercapacitors for Energy Storage**

IRG3 Leader: R. Palai **Participants:** C. Cabrera, L. Cunci
CHESS and Cornell University Collaborators: H. D. Abruña, J. D. Brock, L. Kourkoutis, and D. M. Smilgies.



NSF PREM-CiE²M Outreach

Undergraduate and graduate Education	• The collaborative effort establish by this project will improve the infrastructure for research and education at our institutions by linking CHESS scientist with our team of students and researchers.
CiE²M Scholarship Program	• Supports research efforts of students at the three institutions. • Provide workshops for scholars in preparation to their visit to the CHESS facilities.
Summer Teachers Development Program	• Four Chemistry and/or Physics High School Teachers per year will have the opportunity to perform research activities in the participant laboratories.
Digital Learning Network	• Modules , animations, videos and a virtual tour of CHESS will provide information to the general community through CiE²M Website: http://prem-cie2m.upr.edu
Outreach and Public Engagement	• Demonstrations and interactive tables highlighting basic concepts underling CiE²M research will be use to engage the general public in outreach activities directed to increase their interest in science.

NSF PREM-CiE²M Student Fellows

2018-2019 Cohort of NSF PREM CiE²M Student Fellows