

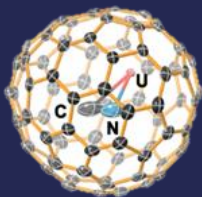


Red de Energía del IPN and ESIQIE



*Prof. Luis Echegoyen International Chair
for Academic Programs, ICIQ, Tarragona, Spain*

March 31, 2025, ESIQIE, building eight, ground floor, General
Lázaro Cárdenas Auditorium 12:00



Fullerene Cages to Stabilize Actinides Inside and for Electrocatalytic and Photovoltaic Applications

Abstract

Because of their unique structures, variable isomeric compositions and tunable electronic properties, fullerenes have found multiple uses and applications in different fields: as electron acceptors and transporters, as structural building blocks, and as molecular containers to stabilize unique clusters inside, among many others.

In this presentation I will highlight the work that we have recently done with: 1) fullerene derivatives that act as electron extracting compounds from perovskite layers in solar cells^[1], 2) pristine fullerene nanosheet and nanotube crystals that exhibit electrocatalytic Hydrogen Evolution Reaction (HER)^[2], 3) fullertubes (C₉₀ C₉₆ and C₁₀₀) for electrocatalytic Oxygen Reduction Reaction (ORR)^[3], and 4) functionalized empty and endohedral fullerenes for HER.^[4] In addition, I will describe the unique endohedral structures formed by incorporating actinide elements and unique actinide clusters inside fullerene cages, which serve as stabilizing agents for these species, which cannot be prepared outside of the carbon structures.⁵

Biography

Prof. Echegoyen was the Robert A. Welch Professor of Chemistry from 2010-2021 (when he retired) at the University of Texas at El Paso and was President of the American Chemical Society in 2020. He was also the Director of the Chemistry Division at the US National Science Foundation from 2006 until 2010. He was Professor and Chair of the Chemistry Department at Clemson University (2002-2006). He has published >525 articles, including 49 book chapters, and his current h index is 96 (Google Scholar, 5 March 2025). He was elected Fellow of the American Association for the Advancement of Science in 2003 and was the recipient of many awards, including the 1996 Florida ACS Award, the 1997 University of Miami Provost Award for Excellence in Research, the 2007 Herty Medal Award from the ACS Georgia Section, and the 2007 Clemson University Presidential Award for Excellence in Research. He was also selected as an ACS Fellow in 2011 and Fellow of the Royal Society of Chemistry in 2019. He works at the Instituto Catalán de Investigación Química (ICIQ) where he is the International Chair for Academic Programs, acting as an ambassador for the institute, mainly focused in Latin America.

References

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- [3] *Angew. Chem. Int. Ed.* **2022**, *10.1002/anie.202116727*.
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- [5] *JACS*, **2023**, *145*, 25440; *JACS* **2023**, *145*, 6710; *JACS* **2023**, *145*, 5645; *Nat. Commun.*, **2022**, *13*, 7192
Nat. Commun., **2018**, *9*, 2753 ; *JACS* **2018**, *140*, 3907; *JACS* **2019**, *141*, 20249