

**UNIVERSITY OF RHODE ISLAND**  
**Department of Chemistry**  
**SEMINAR**

**Room 105 Beupre Center**  
**3:00 p.m, Monday November 25, 2019**

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**University of Illinois at Urbana-Champaign**

***“SECM as a Versatile Toolbox for Elucidating  
Manifold Challenges at the Electrochemical  
Interface”***

**HOST**

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## SECM as a Versatile Toolbox for Elucidating Manifold Challenges at the Electrochemical Interface

Associate Professor Joaquín Rodríguez-López  
University of Illinois at Urbana-Champaign

Elucidating and controlling interfacial reactivity is key to a broad scope of electrochemical studies of catalysts, sensors, and energy storage media. I will present a modern approach to understanding the electrochemical interface using scanning electrochemical microscopy (SECM), a scanned probe technique capable of delivering high spatiotemporal and chemical redox resolution at active surfaces. SECM uses an electrochemical probe to detect and quantify species (e.g. discharged products, homogeneous and heterogeneous intermediates) and the kinetics of processes (e.g. heterogeneous rate constants) through the use of highly localized electrochemical techniques deployed by such probe. [1,2] Our group has expanded the toolbox of SECM techniques to include modes such as Surface Interrogation SECM, where the surface coverage and dynamics of adsorbed intermediates are explored, and the introduction of simultaneous and co-localized SECM-Raman investigations of a variety of interfaces. [3,4] Such in situ approaches give us insight regarding the reactivity of individual reacting sites within bulk electrodes, including their evolution during operation, and enable the [construction](#) of sensible structure–function correlations and electroanalytical models. Furthermore, the use of model interfaces such as mono- and multilayer graphene allow us to use surface-enhanced spectroscopic modes and, in general, to use laser excitation to control reactivity at the mesoscale in exciting new ways. In my talk, I will describe the main features of our instrumental setup, applications to interface and bulk nanomaterials, and emerging directions that amplify the role of hyphenated techniques coupled to the SECM into a highly versatile toolbox for manifold electrochemical processes.

[1] Counihan, M. et al. *ChemElectroChem* **2019**, 3507; [2] Krumov, M.R., et al. *Anal. Chem.* **2018**, 3050; [3] Schorr, N.B. et al. *Anal. Chem.* **2018**, 7848; [4] Schorr, N.B. et al. *Curr. Op. Electrochem.* **2018**, 89.



