

Seminario

Università degli Studi di Padova
Dipartimento di Scienze Chimiche

Ciclo di Seminari 'Frontiers in Chemistry'

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*With a Little Help From My Friends:
The New Era of High Throughput
Electrochemical Multimicroscopy*

venerdì 9 Febbraio 2024, ore 10.30
Aula A, Dipartimento di Scienze Chimiche
Via Marzolo 1 - Padova

Abstract:

Electrochemistry is a beautiful, as well as important, subject! It is at the heart of living systems, on the one hand, and the often-quoted applications in batteries, fuel cells and electrolyzers, on the other. Electrochemical devices are also widely-used in diagnostic and sensor platforms, from measuring glucose in blood to trace gases in the air. All of this makes electrochemistry one of the most fascinating scientific areas to explore, and the key to solving some of the most pressing problems facing the planet.

From the earliest days of electrochemistry, scientists have sought to visualise processes at electrochemical interfaces, and this aspiration has never been more important than today. In this lecture, I shall explain why we invented scanning electrochemical cell microscopy (SECCM) and how we use it at the centre of a multimicroscopy strategy in order to understand structure-activity at the nanoscale.

I will show how SECCM multimicroscopy can be used to solve a range of important problems in electrochemical and interfacial science, spanning energy storage materials, (electro)catalysis and membranes. In essence, the electrochemistry of complex interfaces is studied with SECCM as a set of "single entities", inter alia, individual steps, terraces, defects, crystal facets, grain boundaries, and single particles can be targeted and analysed. Moreover, SECCM facilitates high throughput combinatorial experiments, because parameters can be varied from spot to spot. This aspect of SECCM is further enhanced with in-situ (or operando) optical microscopy techniques to enable smart scanning and visualisation of the SECCM meniscus in real time.

With sincere gratitude to members of the Warwick Electrochemistry & Interfaces Group and collaborators who have contributed to our work in this area.

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