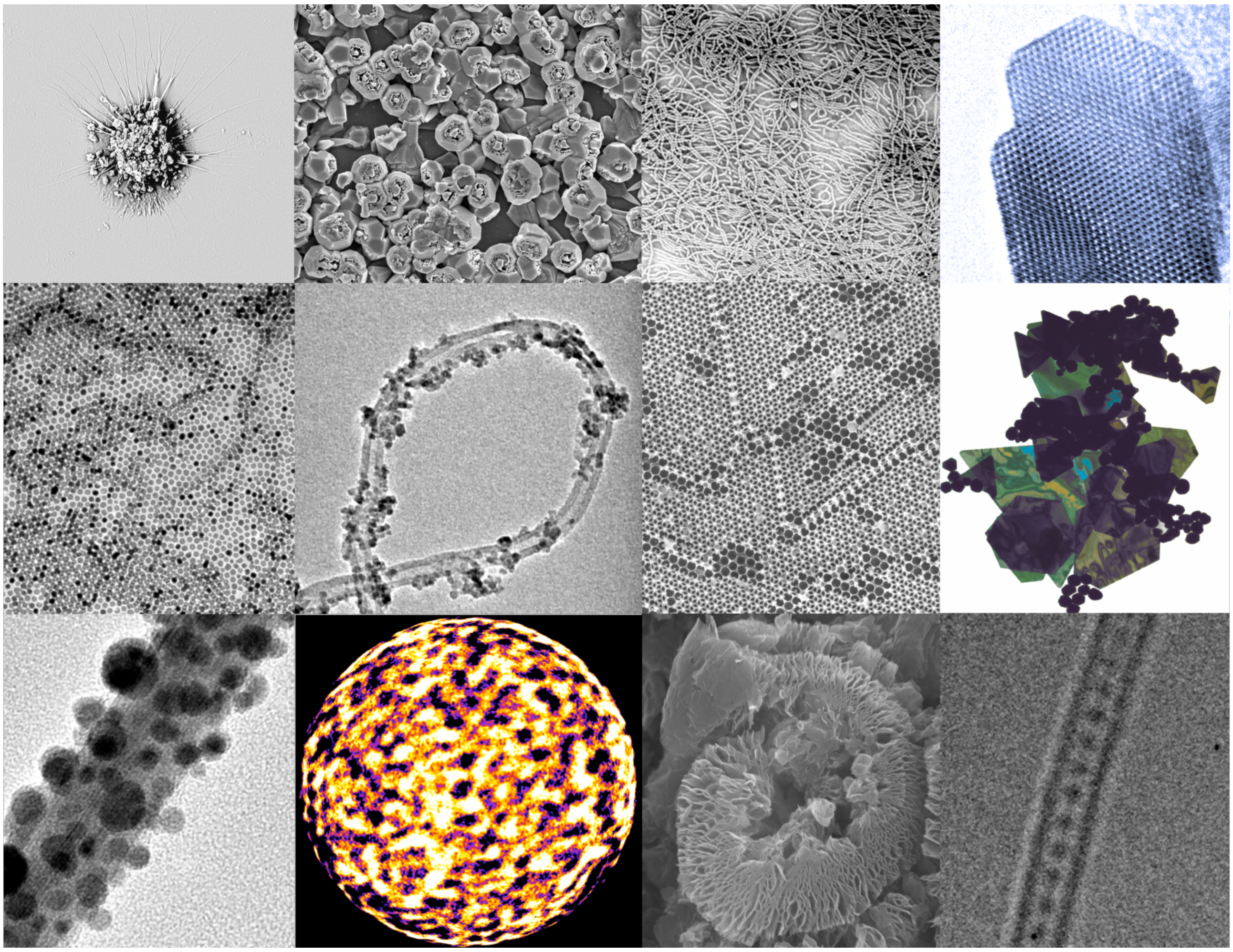
EPSRC/Jeol Centre of Liquid Phase Electron Microscopy

Opening Symposium

London, 10th of July



Venue:
Christopher Ingold Building, 20 Gordon Street,
Department of Chemistry, University College London WC1H 0AJ
Organisers: Lorena Ruiz-Perez and Giuseppe Battaglia

Symposium Programme

11.00-11.30	**Arrival and registration** Department of Chemistry Foyer
11.35 -11.45	**Prof Giuseppe Battaglia** Director of the EPSRC/JEOL Centre for Liquid Phase Electron Microscopy Welcome Chemistry Lecture Theatre
11.45-11.55	**Prof Michael Arthur** UCL ProVost and President Opening Address Chemistry Lecture Theatre
12.00-12.45	**Prof Haimei Zheng** Materials Sciences Division, Lawrence Berkeley National Laboratory Department of Materials Science and Engineering, UC Berkeley Materials Transformations and Dynamic Phenomena at Solid-Liquid Interfaces Chemistry Lecture Theatre
13.00-14.30	**Lunch and poster exhibition** Nhyholm and SCRC rooms
14.35-15.05	**Prof Ivan Parkin** Dean of the MAPS Faculty UCL Adventures in Materials Chemistry- using microscopy Chemistry Lecture Theatre
15.15-15.45	**Prof Mark-Olivier Coppens** Head of Chemical Engineering UCL Nature-Inspired Engineering of High-Performance Porous Materials – Pushing the Boundaries.
15.55-16.05	**Prof Giuseppe Battaglia** Director of the EPSRC/JEOL Centre for Liquid Phase Electron Microscopy Chemistry Lecture Theatre Closing remarks
16.05-16.30	**Coffee break and Facilities tour** Nhyholm and SCRC rooms
16.30-18.30	**Wine reception** Nhyholm and SCRC rooms

Abstracts

Materials Transformations and Dynamic Phenomena at Solid-Liquid Interfaces

Haimei Zheng[1,2]
[1] *1Materials Sciences Division, Lawrence Berkeley National Laboratory*
[2]*Department of Materials Science and Engineering, University of California, Berkeley*

An understanding and ultimately controlling of dynamic processes at solid-liquid interfaces govern the success and lifetime of many functional devices. In the past a few years, my group has been studying materials transformations and dynamic phenomena at solid-liquid interfaces primarily by developing and applying liquid environmental cell transmission electron microscopy. For example, we have been able to study colloidal nanocrystal growth in solution. Noble metal nanoparticles as well as transition metal oxide nanostructures have been achieved in a liquid cell. Many unique formation pathways and intermediate phases have been revealed. I will show facet development during Pt nanocube growth and the imaging of two dimensional nanosheet formation, by real time observation. Then, I will present in situ study of electrochemical processes using electrochemical liquid cells that we developed. Dissolution-deposition at electrode-liquid electrolyte interfaces and phase transformations of the precipitates during charge cycles will be discussed. At the end, I will provide my perspectives on future development and applications of liquid cell electron microscopy.

Adventures in Materials Chemistry- using microscopy

Ivan Parkin[1,2]
[1]*Department of Chemistry, University College London*

This presentation will focus on the use of microscopy for understanding issues relating to photocatalysis, self-cleaning surfaces and the synthesis of nanoparticles in flow systems. It will illustrate how vectorial charge separation is crucial for photocatalysis and how key experimental parameters can affect nanoparticle growth and size.

Nature-Inspired Engineering of High-Performance Porous Materials –Pushing the Boundaries

Marc-Olivier Coppens [1,2]
[1]*Department of Chemical Engineering, University College London* [2]*Centre for Nature Inspired Engineering, University College London*

Research in the Centre for Nature Inspired Engineering at UCL applies fundamental mechanisms underpinning desirable properties in natural systems to address engineering problems, while cognizant of the different context of the natural and the technological problem. Desirable properties include scalability, efficiency, robustness and adaptability. Our nature-inspired (chemical) engineering (NICE) approach focuses primarily on a number of ubiquitous mechanisms, including hierarchical transport networks (such as in lungs and trees), force-balancing (not only at macroscopic scales, but also at the nano-scale, as in aquaporins or chaperones), and dynamic self-organization (patterns on sand dunes, organization of bacteria or people). Nature is particularly powerful in its ways to maintain functionality over a wide range of scales, apply nanoconfinement to achieve higher performance in, for example, separation and catalytic processes, and use dynamics as an organizing principle for adaptability and healing. We will illustrate the NICE approach for the design and synthesis of porous materials for a variety of functions, emphasizing the important role of complementary tools of ever evolving materials characterization tools. We draw examples from (bio)catalysis and separations to fuel cells.