

Structural Evolution of Nanoparticles in the Light of In Situ Bragg Coherent Diffraction Imaging

Marie-Ingrid RICHARD (CEA-Grenoble, Grenoble)

Clément ATLAN (CEA-Grenoble, Grenoble)

Corentin CHATELIER (CEA-Grenoble, Grenoble)

Ewen BELLEC (CEA-Grenoble, Grenoble)

Kyle OLSON (CEA-Grenoble, Grenoble)

Michael GRIMES (CEA-Grenoble, Grenoble)

Arnaud VIOLA (LEPMI, Grenoble)

Maxime DUPRAZ (CEA-Grenoble, Grenoble)

Steven LEAKE (ESRF, Grenoble)

Tobias SCHULLI (ESRF, Grenoble)

Stéphane LABAT (IM2NP, Marseille)

Frédéric MAILLARD (LEPMI, Grenoble)

Abstract

The advent of the new 4th generation x-ray light sources represents an unprecedented opportunity to conduct *in situ* and *operando* studies on the structure of nanoparticles in reactive liquid or gas environments. In this talk, I will illustrate how Bragg coherent x-ray imaging [1] allows to image in three dimensions (3D) and at the nanoscale the strain and defect dynamics inside nanoparticles as well as their refaceting during catalytic reactions [2–4]. As an example, we have successfully mapped the lattice displacement and strain of a Pt nanoparticle in electrochemical environment [5] and under CO reaction [3,4]. I will also discuss the possibility to measure particles as small as 20 nm [6] and to enable high-resolution and high-energy imaging with Bragg coherent x-ray diffraction at 4th generation x-ray light sources [7]. Finally, I will highlight the potential of machine learning to predict characteristic structural features in nanocrystals just from their 3D Bragg coherent diffraction patterns [7].

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References

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