



Università  
Ca' Foscari  
Venezia

Dipartimento  
di Scienze Molecolari  
e Nanosistemi

IL DIPARTIMENTO DI SCIENZE MOLECOLARI E NANOSISTEMI

ORGANIZZA IL SEMINARIO :

# Phase-Controlled Metal NPs for Catalytic Applications

dr. Kohei Kusada

*School of Science, Kyoto University, Japan*

Via Torino 155  
30172 Mestre (Venezia)

T +39 0412348535/8698  
F +39 0412348517/8594

dsmn@unive.it

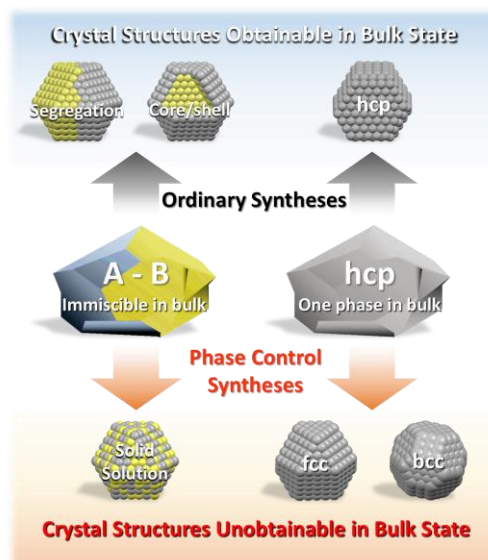
www.unive.it/dsmn

Cod. Fisc. 80007720271  
P.IVA/VAT 00816350276

June 13<sup>th</sup>, 2019

11:00 Conference Room

**Abstract:** There is unrevealed potential for nanomaterials whose crystal structures are unobtainable in the bulk state. Properties of metals such as catalytic properties are influenced by their electronic structure and surface structure. If we could control the crystal structure of materials regardless of elemental species, we would be able to discover a new aspect of elements. Therefore, to exploit the full potential of the elements, it is considered that nanoparticles having a novel phase become candidates for new functional materials. We have successfully synthesized phase-controlled nanomaterials with simple chemical reduction methods. As the examples of phase-controlled materials, we have created solid-solution alloy NPs such as AgRh, PdRu and AuRu, and controlled fcc or hcp crystal structure of Ru and AuRu solid-solution alloy NPs. In the bulk state, these alloy systems are immiscible even above the melting points, also Au or Ru adopts only fcc or hcp phase. These materials show unique catalytic properties compared with conventional materials. For example, since Rh is located between Ru and Pd in the periodic table of elements, Pd<sub>0.5</sub>Ru<sub>0.5</sub> solid-solution alloy has a similar electronic state to Rh and exhibits superior NO<sub>x</sub> reduction catalytic activity to Rh. Furthermore, we succeeded in selectively synthesizing fcc and hcp AuRu NPs and these alloys showed a different catalytic property for oxygen evolution reaction. The details of syntheses and catalytic properties will be discussed.



Gli organizzatori

proff. Maurizio Selva, Alvise Benedetti e Alvise Perosa