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Special Issue on *Nanoalloys: Kinetic and Environmental Behaviour*

From:
Partial discharge localization
in power transformers based
on the sequential quadratic
adopting acoustic emission techniques
by H.-L. Liu and H.-D. Liu

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- ***Prof. Pascal Andreazza**, University of Orléans, ICMN, France*
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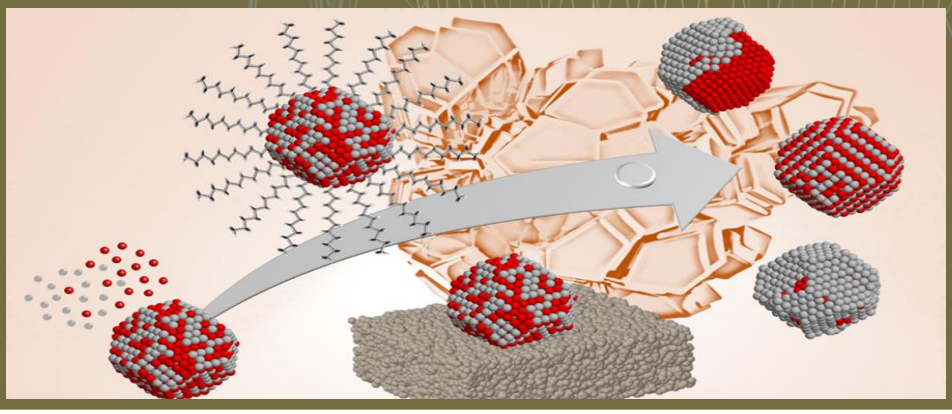
- ***Prof. Liu Xiaoxuan**, Pharmaceutical University of Nanjing, China*



Background

Alloy nanoparticles are bi- or multi-component metallic nanoparticles which are often called **Nanoalloys**. The tremendous growth of interest for nanoalloys comes from the fact that their chemical and physical properties can be tuned by varying their composition and degree of chemical ordering, as well as the size of the nanoparticles. The properties of nanoalloys can

be very different from those of the corresponding bulk alloys and single-metal nanoparticles of the same size. This makes nanoalloys suitable for a wealth of technological applications, as data storage and optoelectronic devices, chemical sensors, fuel cells and heterogeneous catalysts, nanomedicine, in which nanoalloys can be more efficient or less expensive than single-metal catalysts. On a fundamental point of view, nanoalloys are also very interesting for the complexity of their structures and properties and the interplay between them. Such keen interest is also due to the development of new experimental and modeling tools allowing collective and single-particle investigation at ultimate resolution (structure, property), either static or dynamic (time-resolved, multi-scale) and under environmental conditions (in situ, operando).

Aim and Scope of the Themed Issue

The aim of this Special Issue on "Nanoalloys: kinetic and environmental behavior" is twofold: first, provide thorough account of the most exciting current research on the kinetic and environment effects which control the equilibrium and out-of-equilibrium nanoalloy structures and second, extensively document its impact on nanoparticle's chemical and physical properties. A crucial objective in nanoalloy research is to define experimental protocols for controlling both the distribution of the components inside individual nanoparticles and the spatial distribution of a population of nanoparticles in their medium. The second main challenge is to predict the structural evolution in realistic conditions of use or storage (in situ). Nanoalloys are frequently prepared under non-equilibrium conditions which produce metastable configurations evolving to the equilibrium state on a variety of time scales. From the very initial stage of nucleation to long-time ageing, the kinetic way from metastable structures towards a thermodynamic equilibrium may include several steps, from growth to ripening, even coalescence, by diffusion processes in or between particles... These phenomena may also happen because the environment is changing with time. For example nanoalloys may be exposed to a change in temperature, or to a reactive environment (in presence of gas or atmosphere, in a matrix, on a support, in liquid and/or passivated by organic ligands) which induces a change of their equilibrium state. A scientific breakthrough in this domain would be achieved by a true combination of theoretical modelling of kinetic behaviour (by Langevin Dynamics, Molecular Dynamics, Kinetic-Monte Carlo methods …), with *in situ* and real time experimental investigation methods, like synchrotron and lab spectroscopies, scattering (XAS, SAXS, WAXS-XRD, XPS …) or microscopies and associated local spectroscopies (from TEM-STEM, tomography, AFM-STM techniques) in vacuum/under-gas/in-liquid media.

Submissions

All relevant papers will be carefully considered, reviewed by a distinguished team of international experts, and published in accordance to the Journal's standard policies. Full research papers and comprehensive review articles can be submitted online via the journal's submission and peer review site.

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