SEMINAR SERIES

International Institute for Carbon-Neutral Energy Research
Kyushu University

Title Controlling nanostructures and phase transformations in ultra fine grained materials processed by severe plastic deformation for energy applications

Speaker Dr. Xavier Sauvage
Research Scientist
CNRS (National Center for Scientific Research)
France

Date & Time Friday, September 12, 2014 2:00 p.m.
Place I²CNER Hall, Ito campus, Kyushu University

Abstract

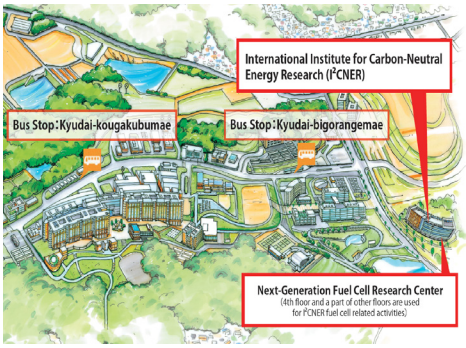
Nanostructuring metallic alloys appears as a promising route to achieve high strength and low weight materials or materials with unique combination of high strength and high electrical conductivity for low carbon emission in the automotive industry. This presentation reports about the achievement of such unique structures in aluminium alloys processed by severe plastic deformation. In such systems, grain size refinement mechanisms are controlled both by the creation of crystalline defects (especially dislocations) and dynamic recovery processes. In this presentation, it is proposed to discuss about the influence of alloying elements considering their interaction with such defects. These atomic scale mechanisms were investigated by analytical microscopy. After a short introduction summarizing the complimentarily application of probe corrected TEM and Atom Probe Tomography (APT), various examples of ultrafine grained alloys will be presented. Beside the classical influence of the processing temperature and of the solute content on the final grain size, we will focus on specific cases of deformation induced solute redistribution like grain boundary segregations, clustering or nanoscale precipitation. It will be shown that such features can dramatically influence the properties and that they are promoted first by the enhanced atomic mobility resulting from deformation induced defects (especially vacancies) and second by "non-equilibrium" boundaries with extrinsic dislocation arrays. As a conclusion, some possible routes to optimize the combination of processing parameters and alloy compositions will be proposed to achieve enhanced combination of properties for future applications in low weight applications of the automotive industry.

About the Speaker

Dr. Xavier Sauvage made his PhD on Atom Probe Tomography (APT) investigation of phase transformations in nanoscaled composites processed by severe plastic deformation. After a short stay at the Max Planck Institut in Stuttgart, he was hired in 2002 by the CNRS to lead some research on nanostructured materials and severe plastic deformation at the University of Rouen, France. Using APT in combination with transmission electron microscopy, he investigates deformation induced atomic transport, interdiffusion and phase transformations especially in nanostructures processed by severe plastic deformation.

Host: Professor Zenji Horita

For registration, please visit our website:
http://i2cner.kyushu-u.ac.jp/



CONTACT: Research Support and International Affairs Division
International Institute for Carbon-Neutral Energy Research
TEL:092-802-6934 email:wpikenkyu@jimu.kyushu-u.ac.jp