

**Jeudi 11 avril 2013 à 10h30**

**Salle de réunion du SRMP – Bâtiment 520 - Pièce 109**

---

## ***Analytical TEM characterization of ODS steels and stability under irradiation***

*Vanessa de Castro*  
*Physics Department*  
*University Carlos III de Madrid - Espagne*

---

Oxide dispersion strengthened reduced activation (RA) ferritic/martensitic and ferritic steels are considered as structural materials for the blanket of future fusion reactors. A homogeneous dispersion of hard oxide nanoparticles in the matrix could block the motion of dislocations and help to increase the maximum service temperature of these steels in more than 100°C as compared with conventional RA steels. The nanoparticles could also help to trap helium atoms and point defects, which would reduce the swelling and hardening effects that cause the deterioration of the steels under irradiation. ODS steels are normally produced by mechanical alloying (MA) and subsequent consolidation by hot isostatic pressing or hot extrusion to provide a homogeneous dispersion of the nanoparticles in the matrix. These powder metallurgy routes lead to very complex microstructures with surplus oxygen, micron-sized carbide precipitation and residual porosity besides the target dispersion of nanoparticles. Moreover, it has been recently found that the structure of these strengthening nanoparticles may differ from that of the starting  $Y_2O_3$  oxide, which could have an effect on the thermal stability of the dispersion and change the mechanical performance and irradiation resistance of these ODS steels.

This presentation will report the microstructural characterization of several nanostructured RA ODS 12-14 wt% Cr steels produced at the University Carlos III de Madrid. Moreover, the results on the microstructural analysis of the ODS Fe-12Cr alloy single ion implanted with  $Fe^{4+}$ , and simultaneously triple beam implanted with  $Fe^{8+}+He^++H^+$ , will also be presented, with special emphasis on the stability of the secondary phases present in the steel.

---

Les visiteurs de nationalité étrangère hors Union Européenne sont priés de bien vouloir avertir impérativement 3 semaines à l'avance, et ceux de l'Union Européenne 1 ou 2 jours avant le séminaire, le Secrétariat du Service de leur entrée sur le Centre : Tel : 01 69 08 66 64 - Fax : 01 69 08 68 67.

Commissariat à l'énergie atomique et aux énergies alternatives  
DEN/DANS/DMN Service de Recherches de Métallurgie Physique  
Centre de Saclay – Bât. 520 - 91191 Gif-sur-Yvette Cedex – France