



## Séminaire PIMM

Jeudi 5 juillet 2012 à 14 heures

Arts et Métiers ParisTech, 151 bd de l'hôpital, 75013 Paris

**14h00**

**Gonzalo Gonzales**

*Professeur, Instituto de investigaciones en materiales, Universidad Nacional Autonoma de Mexico*

### **A DETAILED MICROSTRUCTURAL STUDY OF HIGHLY DEFORMED AL-BASED ALLOYS**

Highly strained aluminum (Al) based alloys by severe plastic deformation process (SDP) have shown high industrial and scientific interest. The combination of the substantial increase in yield strength and the marginal drop in ductility, have been the main factors of the success of such process.

However, there are only a few Al alloys that could be treated by the SPD processes. Being the main short coming the premature formation of cracks, even at relatively low magnitudes of strain. With the aim of finding out the causes of such behaviour, a detailed microstructural study of two Al based alloys, i.e. Al-Sn (non hardenable alloy) and a Al-Cu (2017 wrought *heat* treatable alloy, T4-temper) has been proposed.

The microstructural analysis was carried out by means of Scanning and Transmission Electron Microscopy (SEM and TEM) and by several XRD techniques (texture and residual stress measurements). A Vickers microhardness mapping was also performed to identify the zones with the highest deformation.

Based on the aforementioned techniques, the following can be concluded: a) zones with high plastic deformation are heterogeneously distributed; b) the highly compressed region of the sample, located near or at the surface avoided the formation of superficial initiator cracks c) in spite of energy introduced to the system by the deformation process, cracks were not observed in the Al-Sn alloys but they appear in the Al-Cu alloys at the initial ECAP pass.

**14h40**

**Jacques Rault**

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### **PLASTICITE DANS LES VERRES : LES LOIS DE COMPENSATION ET DE VFT**

On montrera que la loi de G-VFT généralisée explique les propriétés des liquides au dessus et au dessous de la transition vitreuse. Ces matériaux (verres hors d'équilibre et liquides à l'équilibre) soumis à une perturbation (saut de température, contrainte ..) relaxent selon la loi de KWW (Kohlrausch-William-Watt) dont on discutera l'origine. La relation entre la loi G-VFT et la loi de compensation (règle de Meyer-Neldel) sera démontrée. Les effets du vieillissement physique sur la contrainte de plasticité, la relaxation des contraintes et le fluage sera discuté dans ce cadre.

**15h40**

**Vin & petits fours**