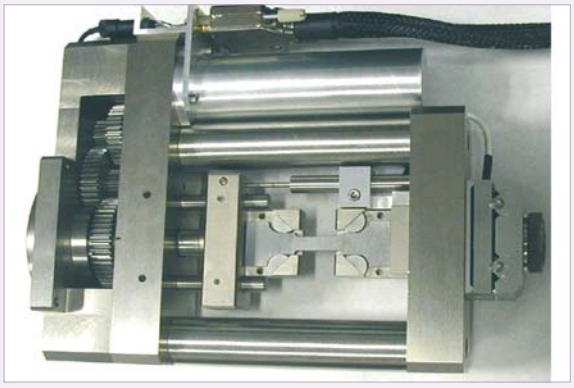

Figure 1: the tensile machine, equipped with a sample

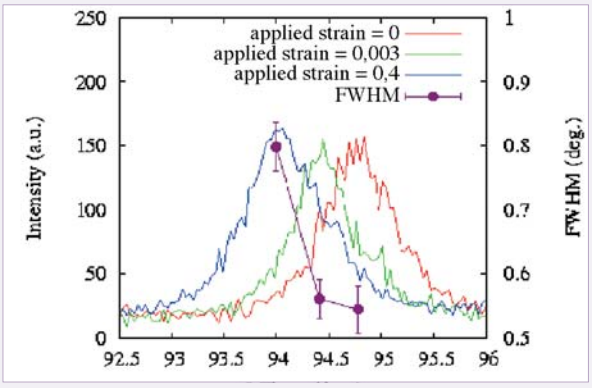

Figure 2: (111) peaks and FWHM recorded on G5.2 for several loadings

[Collaboration: V. Klosek, M.H. Mathon, LLB; V. Ji, LIM-ENSAM, Paris; R. Chiron, LPMTM, Villetaneuse]

[C6. S. Jakani] **Deformation and recrystallization mechanisms of CuSn alloys (bronze)**

The optimization of the macroscopic properties requires the comprehension of the deformation and recrystallization mechanisms. In the case of the copper and of its alloys, the deformation step conditions mainly the mechanisms of recrystallization. Neutron diffraction, performed on 6T1, was used to characterize the deformation texture, stored energy after various rates of rolling (between 0 and 90% of deformation) and the activation energy of recrystallization with "in situ" measurements. The addition of tin (4 to 9%) in pure copper lowers the stacking fault energy. Thus, it is not astonishing to observe a texture of deformation primarily consisted of the a fibre (with the Brass and Goss components). During cold rolling, stored energy increases with the deformation rate but contrary to the case of pure copper and brasses, its distribution is homogeneous between the various crystallographic orientations. A light increase of energy is observable with the tin content. Measurements of kinetics of recrystallization reveal that the energy of activation of the recrystallization process decrease with the deformation rate but remains much more important than in pure copper. The recrystallization is accompanied by the development of the orientations C {112} <11-1> and G {110} <001>. These results show that recrystallization is not only interpretable by stored energy but that the kinetic aspect via the grain boundaries mobility is a prevalent factor in the presence of tin. The presence of an element of addition can then reinforce the energy stored by decreasing the mobility of dislocations and thus act on the dynamic phase of restoration. By the same mechanism, the recrystallization is slowed down. The copper alloys thus present distinct behaviours, a priori depend on the nature of the element of addition which acts differently on the mechanisms of deformation and the mobility of dislocations and the grain boundaries.

[Collaboration: S. Jakani, S. Melusson, M.H. Mathon, LLB]

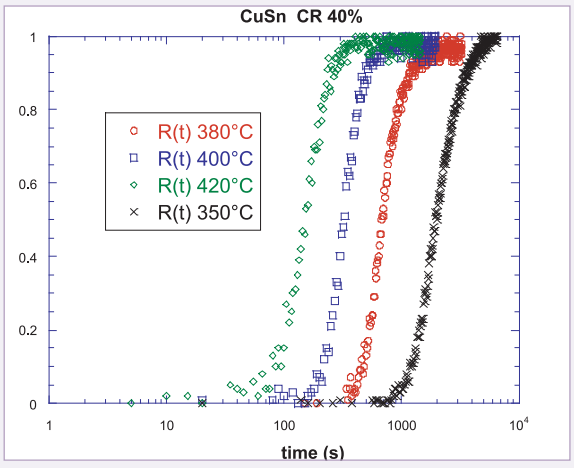

Figure 1: Recrystallization kinetic on the CuSn4% cold rolled up 40%

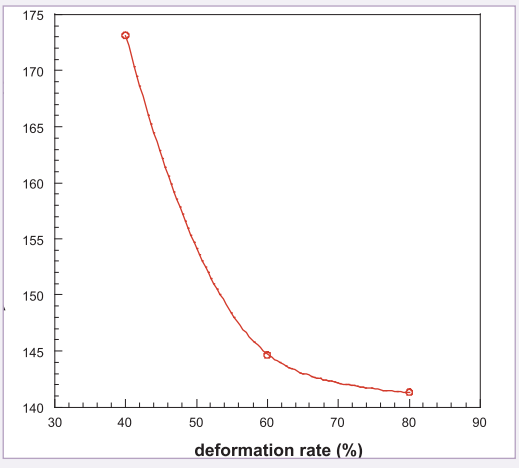

Figure 2: Recrystallization activation energy (kJ/mol) versus the deformation rate.