ESRF	**Experiment title:** ASSESSMENT OF DAMAGE EVOLUTION IN MODEL METAL MATRIX COMPOSITE BY X-RAY MICROTOMOGRAPHY	**Experiment number**: HS 896
Beamline:	**Date of experiment**: from: 16 September 1999 to: 20 September 1999	**Date of report**: 04/11s/2001
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Report:

During this experiment, seven X-ray microtomography scans were performed on a model metal matrix composite. This composite, fabricated for the PhD research of M. Babout, consists of a very ductile metal matrix (commercially pure Aluminium) reinforced by approximately 4% in volume fraction of spherical ceramic particles (Zirconia/Silica balls).The results concerning this experiment were recently published in Acta Materialia *(reference : Acta Mater. 49 (2001) 2055-2063).* The corresponding abstract is written below.

Abstract—Damage mechanisms of model materials have been studied using in situ tensile tests coupled with high resolution X-ray tomography. This non destructive technique revealed that 50% of the particles were pre-damaged by the extrusion. The initiation and growth phases of the damage process were quantified using the three dimensional images. The growth phase, measured both locally (on isolated particles) and globally (in the entire block) was compared with the Rice and Tracey prediction which was shown to overestimate the global prediction and to give a reasonable agreement of the local growth rate. Discrepancies between prediction and experiments could be partly quantified by introducing the effect of the growth threshold in the Rice and Tracey analysis. The scatter in the measured thresholds and growth rates were attributed to local crystallography and to local spatial arrangement effects. *2001 Published by Elsevier Science Ltd on behalf of Acta Materialia Inc.*

Three reconstructed images are shown below to complement the abstract. They show the same longitudinal slice at three deformed stages (initial state and two deformed states, the second one presents a gradient of deformation due to the necking of the sample). In figure 1a, detail A presents a pre-existed hole at the particle/matrix interface. Decohesion appears in figure 1b (detail B).This hole grows and finally interlinks with other voids, as shown by detail C in figure 1c.