

IN-SITU SYNCHROTRON X-RAY TOMOGRAPHY STUDIES OF CREEP VOID EVOLUTION IN BRASS ALLOYS AND STEELS

A. Pyzalla¹, K. Dzieciol¹, A. Isaac¹, F. Sket¹, A. Borbély¹, G. Sauthoff¹, T. Buslaps², M. Di Michiel²

¹Max-Planck-Institute for Iron Research, Max-Planck-Str.1, 40237 Düsseldorf, Germany

²European Synchrotron Radiation Facility, ESRF, BP220, Grenoble, France

Synchrotron X-ray tomography allows in a unique way the non-destructive, three-dimensional study of creep damage evolution in bulk materials. The results of the experiments reveal the development of the number and the size of creep voids and damage with increasing creep time. For the first time the evolution of individual creep pores during creep time can be investigated and void coalescence can be monitored. Void sizes, shapes, orientations and coalescence are quantified. It can further be shown that in-situ tomography combined with a constant temperature gradient along the gauge length of the sample allows for the determination of the activation energy of creep of only one single specimen.