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IN SITU TOMOGRAPHIC CHARACTERIZATION OF SINGLE CAVITY-GROWTH DURING HIGH-TEMPERATURE CREEP OF COPPER AND BRASS

Augusta Isaac[1]

Abstract

The service lifetime of metallic components for high temperature applications is usually controlled by creep damage consisting of nucleation, growth and coalescence of grain boundary voids. This work presents a conceptually new approach to void growth characterization based on synchrotron microtomographic measurements performed in-situ during creep. We show that the average growth rates of voids in leaded brass and copper are larger by a factor of about 25 and 46 than predicted by the continuum theory, respectively. The distorted shape of voids reconstructed by nanotomography suggests that the enhanced growth rate is related to the crystallographic nature of creep deformation.

[1] *Laboratório Nacional de Luz Síncrotron.*