MM 39 Mechanische Eigenschaften II

Zeit: Dienstag 11:30–12:15 Raum: TU H111

MM 39.1 Di 11:30 TU H111

EFFECT OF MECHANICAL STRESS FIELDS ON RECRYSTALLIZATION OF AN Al-Mg ALLOY — •Carmen Schäfer and Myrjam Winning — Institut für Metallkunde und Metallphysik, RWTH Aachen. Kopernikusstr. 14, 52056 Aachen

The motion of grain boundaries is the key phenomenon of recrystallization and grain growth and dominates the evolution of texture and microstructure, i.e. the macroscopic physical and mechanical properties of a material, in particular of a part in service. Recently it could be experimentally shown that mechanical stresses can influence the dynamical behavior of individual, planar grain boundaries. From these results, we can conclude that there must be also effects of mechanical stress fields on the behavior of grain boundaries in polycrystalline materials. Consequently, the aim of this study was to demonstrate the effect of mechanical stresses on the recrystallization behavior of an Al-2

MM 39.2 Di 11:45 TU H111

Dynamic recrystallization of torsion deformed NiAl — •Burghardt Klöden[1], Werner Skrotzki[1], Carl-Georg Oertel[1], and Erik Rybacki[2] — [1]Institute of Structural Physics, Division of Metal Physics, Dresden University of Technology, D-01062 Dresden, Germany — [2]Geo Research Centre Potsdam, D-14473 Potsdam, Germany

Samples of the binary intermetallic compound NiAl with different initial textures were deformed in torsion in a Paterson type rock deformation machine under hydrostatic pressure of 400 MPa and at a constant maximum strain rate of $10^{-4}s^{-1}$ at temperatures between 800K and 1300K. The maximum shear strain after up to 3 revolutions was 9 to 18. High temperature torsion as one of the modes of severe plastic deformation has been used, because due to a gradient in shear strain across the sample, the continuous development of microstructure and texture with strain can be investigated. Experimental methods included the use of the EBSD technique and high energy synchrotron radiation. The mechanisms of microstructure and texture development will be discussed with emphasis being put on dynamic recrystallization phenomena.

MM 39.3 Di 12:00 TU H111

Dynamic Recrystallization under Transient Deformation Conditions — •Matthias Frommert and Günter Gottstein — Institut für Metallkunde und Metallphysik, RWTH Aachen, D-52056 Aachen, Germany

Dynamic recrystallization (DRX) is a softening process that occurs during high temperature deformation and, therefore, affects the strength of a material. Dependent on the deformation parameters and initial grain size the typical DRX flow curve is known to display either a single-peak or multiple-peak behaviour before attaining steady-state stress. Transient deformation conditions such as changes of strain rate or temperature not only influence the shape of the flow curve but also the dynamically recrystallized grain size which is dependent on the steady-state flow stress.

Compression tests were performed with an austenitic steel Alloy 800H to investigate the mechanisms of DRX. Microstructure and texture were analysed using optical microscopy, SEM and X-ray diffraction, respectively. When the true strain rate is changed at a defined strain during the experiment the dynamically recrystallized grain size readjusts within a short strain interval as evident from the resulting change of steady-state flow stress. The inverse pole-figures demonstrate that during the early stages of high temperature deformation a typical deformation texture evolves which is randomized by the onset of DRX.