

MM 64: Invited talk Durst

Time: Thursday 15:00–15:30

Location: BAR 205

Invited Talk MM 64.1 Thu 15:00 BAR 205
Microstructural refinement, rate sensitivity and structural stability of Cu-X solid solutions after severe plastic deformation — ●KARSTEN DURST — Physikalische Metallkunde, TU Darmstadt

Severe plastic deformation processes are well established for producing nanostructured and ultrafine grained metals. The influencing factors for microstructural refinement are not fully understood and are studied in this work for Cu-Al, Cu-Sn and Cu-Zn. The alloying elements have been chosen based on solid solution strengthening and stacking fault energy, where Sn is a strong solid solution strengthening element, with little influence on stacking fault energy and Zn as well as Al strongly

reduce the stacking fault energy, with a medium contribution to solid solution strengthening. The mechanical properties of the alloys are assessed in both ufg and coarse-grained state using both macroscopic and nanoindentation approaches and electron back scatter diffraction in transmission mode is used to analyze the microstructural evolution. The strongest grain refinement is found for the CuSn5 alloy, which also exhibits the highest strength after severe plastic deformation. The nc-materials are highly strain rate sensitive, however CuSn5 with the lowest grain size also exhibits a low strain rate sensitivity. The paper will discuss the mechanism leading to grain refinement in conjunction with dislocation mechanism at grain boundaries, causing both a relatively low rate sensitivity and a strong refinement during SPD processing.