

MM 29: Invited Talk (Hauptvortrag) Divinski

Time: Tuesday 15:00–15:30

Location: BAR 205

Invited Talk MM 29.1 Tue 15:00 BAR 205**Grain boundaries in metals: phase and structure transitions studied by tracer diffusion** — ●SERGIY DIVINSKI — Institut für Materialphysik, Universität Münster

Recent advances in measurement techniques have allowed extending the radiotracer experiments on grain boundary diffusion of solutes in bicrystals to substantially lower temperatures. As a result, the data on grain boundary diffusion coefficients and those of the product of the solute segregation and the grain boundary width were independently evaluated and compared with the polycrystalline data [1]. The segregation of Ag at Cu $\Sigma 5$ and $\Sigma 17$ grain boundaries is found to be significantly stronger as compared to that at general high-angle grain boundaries as they are present in annealed polycrystalline copper. The

grain boundary diffusion data predict a structural transition in the $\Sigma 5$ grain boundary at a temperature of about 850 K what was recently confirmed by dedicated MD simulations [2]. Strong solute segregation could induce grain boundary phase transitions, too. An abrupt increase of the grain boundary diffusivity was observed in a two-phase (solid+liquid) region of the Cu-Bi phase diagram [3]. Such diffusion enhancement exists even in a single phase (solid solution in Cu) region manifesting the existence of a pre-wetting GB phase transition in this system. These and other findings with respect to short-circuit diffusion in bi- and tri-crystals are reviewed and critically discussed.

[1] S.V. Divinski, et al. Phys Rev B 85 (2012) 144104.

[2] T. Frolov, et al. Phys Rev Lett 110 (2013) 255502.

[3] S.V. Divinski, et al. Phys Rev B 71 (2005) 104.