

Recent progress in micromechanical testing of grain boundaries

James P. Best

Group leader for Nano-/Micromechanics of Materials

Group leader for Thin-films & Nanostructured Materials

Max-Planck-Institut für Eisenforschung GmbH, Max-Planck-Str. 1, 40237 Düsseldorf, Germany

Grain boundaries hold particular importance as they dictate the functional properties of polycrystalline materials, and this is reflected in the wealth of micromechanical research into their effects using primarily chemically homogeneous systems. Less understood are systems containing a degree of chemical heterogeneity, ubiquitous to applied materials, as found when impurity species segregate to grain boundaries. In approaching this topic, two distinct examples will be presented: (i) the strengthening effects of silver at $\Sigma 5$ boundaries in copper studied by micropillar compression; (ii) the embrittling response of phosphorous at random high angle boundaries in tungsten studied through notched microcantilever beam bending experiments. A special focus is placed on the use of thin-film systems as conduits for advancing site-specific testing.

Presentation length: 30-40 mins