Postdoctoral position to simulate plasticity in presence of grain boundaries

Polycrystalline plasticity involves the interaction of dislocations with grain boundaries. So far, mostly simple high-symmetry grain boundaries have been studied while polycrystals are composed of general high-angle "dirty" grain boundaries, whose resistance to dislocations is unknown. We know from microscopic studies that such boundaries are able to absorb several dislocations before any significant reaction occurs, such as nucleation of new dislocations in the adjacent grain, but the details of how this happens and for instance, what controls the number of absorbed dislocations, remains elusive. Such criteria are however crucial to develop realistic local rules to implement in mesoscale simulations of polycrystalline plasticity, like dislocation dynamics.

The aim of the proposed postdoc is to perform large-scale Molecular Dynamics simulations in controlled geometries to study the interaction of groups of dislocations with a variety of high-angle grain boundaries. We are mainly interested in Face-Centered Cubic and Hexagonal Close Packed metals. In the latter case, twinning will also be taken under consideration.

This 1.5 year postdoctoral position at the Institut Lumière Matière of the University of Lyon is part of a European program, Fatigue Simulation near Surfaces (FASS), involving the University of Lyon (D. Rodney) and the CNRS/ONERA (D. Devincre) in France, the University of Erlangen-Nürnberg (S. Sandfeld and M. Zaiser) and the Karslruhe Institute of Technology (R. Schwaiger) in Germany, as well as the University of Antwerp (D. Schryvers and H. Idrissi) in Belgium.

The ideal candidate should hold a recent (less than 2 years) PhD degree in Materials Science, Mechanical Engineering, Physics or related fields, with a strong expertise in either atomistic simulation of crystalline defects or Dislocation Dynamics simulations.

Interested candidates should contact Prof. David Rodney (david.rodney@univ-lyon1.fr, http://ilm-perso.univ-lyon1.fr/~drodney/).