Foreword

Solid-State Interfaces II: Toward an Atomistic-Scale Understanding of Structure, Properties, and Behavior Through Theory and Experiment

The following papers in this special issue of *Metallurgical and Materials Transactions A* were presented at the *Symposium of Solid-State Interfaces II: Toward an Atomistic-Scale Understanding of Structure, Properties, and Behavior through Theory and Experiment* organized during the TMS Annual Meeting at Orlando, Florida, March 11-15, 2012. This symposium was the second in a series of such conferences focusing on interface structure and interfacial properties.

The symposium was well attended, with approximately 70 presentations, among whom 18 were invited. The first session "atomic level structures, compositions, and general methods,"chaired by A. Ardell and X.-Y. Liu, started with an invited talk by M. Harmer on the grain-boundary "complexion." This was followed by an invited talk by A. Misra on defect structures of interphase boundaries in metallic nano-composites. The next invited talk was by H. Fraser on the structural and compositional transitions across interfaces in titanium alloys. The second session, chaired by D.N. Seidman and B.P. Uberuaga, focused on the morphological stability of interfaces. Two invited talks in this session were by D. Siegel on the Al-Cu precipitates and P. Bellon on the evolution of hetero-interfaces in Cu alloys forced by severe plastic deformations. The third session, chaired by R.G. Hoagland and E. Marquis, continued with the theme of interface interaction with defects, among which were three invited talks by M. Demkowicz on the feasibility of designing interfaces immune to helium damage; L. Hsiung on the effect of nanoparticle–matrix interfaces on the cavity formation in ODS ferritic steels under irradiation conditions, and B.P. Uberuaga on the defect-interface interactions in oxide ceramics. The fourth session, chaired by P. Bellon and R. Averback, had two invited talks on the mechanical properties of interfaces: one by R. Averback on the creep deformation in ion irradiated nanocrystalline Cu alloys, and the other by G. Tucker on resolving the contribution of interfaces in the nanocrystalline Cu deformation in atomistic simulations. The fifth session, chaired by M.J. Demkowicz and S.M. Valone, had three invited talks on nonmetallic semiconductor interfaces, semiconductor/metal interfaces, and semiconductor superlattices by W. Windl, R. Ramprasad, and E. Zolotoyabko. The sixth session, chaired by G. Schmitz and R. Kirchheim, featured three invited talks on grain-boundaries and triple junctions by G. Gottstein, Z. Balogh, and R. Pond. The final session, chaired by D.E. Spearot and D. Medlin, had two invited talks: one by M. Asta on the mobilities and driving forces of shrinking island grains, and the other by E. Marquis on the oxidation at oxide/metal interfaces. In addition, a poster session was organized.

The four articles in this set provide a glimpse of the broad topics discussed in the sessions above. The first article by Z. Balogh *et al*. describes experimental investigation of buried metallic interfaces by atom probe tomography, followed by HRTEM study of irradiation-induced cavities in ODS ferritic steel by L.L. Hsiung. The third article by T. Stan et al. describes characterization of the naturally selected Fe-pyrochlore interfaces. The last article in this set is by W.-Z. Zhang on the description of interfacial dislocation structures using O-lattice theory.

Symposium Organizers:

Xiang-Yang (Ben) Liu

Douglas E. Spearot

David N. Seidman

Guido Schmitz