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**The strength characterization of Al/Si interfaces with a hybrid nanoindentation/FEM method** SHUMAN XIA, Division of Engineering, Brown University, YUE QI, THOMAS A. PERRY, GM Research & Development Center, KYUNG-SUK KIM, Division of Engineering, Brown University — The mechanical property characterization of the reinforcement/matrix interface in a metal matrix composite (MMC) is entailed for tailoring the interface in the microstructure design of the composite. In this work we developed a hybrid method to characterize the interface strength of an MMC, combining a nanoindentation experiment and a finite element analysis. The nanoindentation experiment was carried out by indenting individual reinforcement particles on a free surface with a nanoindenter. The dependence of indentation response on the interface properties was systematically studied through the finite element analysis with cohesive zone modeling of the interface failure. The interface strength could then be extracted from the comparison between the experimental and FEM results. With this method, the shear strength of an Al/Si interface was measured approximately 240MPa which compares well with the lower bound of an atomistic simulation with a modified EAM potential. The intrinsic fracture toughness of the interface crack tip surrounded by densely populated dislocations was measured 0.25 J/m<sup>2</sup>. We also studied the effect of the strontium modification on the interface strength with this hybrid method.

Shuman Xia  
Division of Engineering, Brown University

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