Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Mechanical properties of van der Waals interactions at compositionally graded interfaces between metals and organic semiconductors[1] HUARUI SUN, Department of Mechanical Engineering, University of Michigan, VLADIMIR STOICA, Department of Physics, University of Michigan, MAX SHTEIN, Department of Materials Science and Engineering, University of Michigan, ROY CLARKE, Department of Physics, University of Michigan, KEVIN PIPE, Department of Mechanical Engineering, Department of Electrical Engineering and Computer Science, University of Michigan — Interfacial bonding plays an important role in energy transfer (e.g., electrical conduction, thermal transport, or acoustic coupling) in composite materials as well as electronic and optoelectronic devices. In this work we use an ultrafast laser to excite vibrational modes in a thin aluminum film that is in contact with a small molecular organic semiconductor (copper phthalocyanine, CuPc). From the measured acoustic dynamics, we derive the fundamental mechanical properties of the van der Waals bonding at the Al/CuPc interface, and further study how these mechanical properties change in a series of samples as the interface is compositionally graded. The implications of these results are discussed in the contexts of interfacial thermal resistance, organic optoelectronic devices, and thermoelectric energy conversion.

[1]We gratefully acknowledge the support from the United States Air Force Office of Scientific Research.

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Date submitted: 11 Nov 2011 Electronic form version 1.4