Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Building a Colloidal Proxy for Binary Metallic Glasses RYAN KRAMB, National Research Council, KATHARINE JENSEN, Harvard University, LOGAN WARD, Ohio State University, RICHARD VAIA, DANIEL MIRACLE, Air Force Research Laboratory — Current experimental techniques for determining the atomic structure of metallic glasses and testing structural theories such as the efficient cluster packing model are limited to diffraction and scattering. These techniques give only average structural information that could result from many different unique structures. Simulations of metallic glasses, on the other hand, give the exact structure of every atom in the system, but are limited by computing power to a few thousand atoms which are equilibrated over a few nanoseconds. This leads to uncertainties in the reliability of reproducing real metallic glass structures. To overcome these deficiencies, we have created a proxy experimental system that can be treated much like a simulation. We have synthesized suspensions of larger, colloidal scale particles (2-3um in diameter) to build pseudo binary metallic glasses. Using confocal microscopy imaging techniques, we determine the three dimensional position of hundreds of thousands of individual particles (atoms), and calculate structural information such as the radial distribution function, Voronoi volume, and partial coordination numbers. We compare these results to both theoretical calculations and experimental results of real metallic glasses. The focus here will be on a building a proxy for the CuZr binary system.

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Date submitted: 09 Jan 2012 Electronic form version 1.4