Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Microscopic and mechanical roles of disorder in a jammed polycrystal[1] NATHAN KEIM, PAULO ARRATIA, University of Pennsylvania — We present experiments on the relationship between the microscopic structure of a polycrystalline 2D solid and its response to deformation. The material is a monolayer of mutually repulsive particles adsorbed at an oil-water interface, for which we simultaneously measure bulk mechanical response (oscillatory shear rheology) and image the motion of many individual particles. Crystallinity is varied through changes to materials and preparation. We investigate the role of less-ordered regions (e.g. grain boundaries) in the system's response to deformation, including the locations of particle rearrangements as deformation amplitude is increased. We consider the extent to which even a small amount of disorder makes elastic deformation, energy dissipation, and yielding behaviors similar to those of highly disordered materials.

[1]This work was supported by the Penn NSF MRSEC (DMR-1120901).

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Date submitted: 15 Nov 2013 Electronic form version 1.4