

Abstract Submitted  
for the MAR13 Meeting of  
The American Physical Society

**Direct observation of the nucleation in colloidal solid-solid transitions**<sup>1</sup> YI PENG, FENG WANG, ZIREN WANG, YILONG HAN, Department of Physics, Hong Kong University of Science and Technology, Clear Water Bay, Hong Kong, China — Solid-solid phase transitions are ubiquitous in nature, but their microscopic mechanisms remain poorly understood. We employed thermally sensitive microgels to study the solid-solid transitions between square and triangular lattices in colloidal thin films. Two types of nucleation processes were directly observed by video microscopy and studied at the single-particle level. Under low flow rates, the nucleation is a two-step process: square lattice  $\rightarrow$  liquid nucleus  $\rightarrow$  triangle nucleus and its precursor is a local particle-exchange loop, whereas under high flow rates the nucleus of the triangle lattice forms directly from a dislocation pair by a martensitic mechanism. We measured the critical nucleus size, the energy barrier height and the hysteresis loop of the solid-solid transitions. Our results cast new light to solid-solid transitions in carbon systems, nano-crystals and geophysics.

<sup>1</sup>Hong Kong GRC grants 601208 and 601911

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Date submitted: 27 Nov 2012

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