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Heterogeneities in Two-Dimensional Pinned Liquids JING-XIAN LIN, T-12 and T-CNLS, Los Alamos National Laboratory; University of California, Riverside, CHARLES REICHHARDT, T-13 and T-CNLS, Los Alamos National Laboratory, ZOHAR NUSSINOV, T-11, Los Alamos National Laboratory, LEONID P. PRYADKO, University of California, Riverside, CYNTHIA J. OLSON REICHHARDT, T-12 and T-CNLS, Los Alamos National Laboratory — We introduce a model system in which the amount of heterogeneous motion in a liquid phase just above melting can be controlled directly. Using numerical simulations, we place a two-dimensional assembly of repulsively interacting colloids on a commensurate triangular substrate of pinning sites, and then randomly deactivate a fraction n_p of the pinning sites. Heterogeneous motion is induced when the unpinned colloids melt at lower temperatures than the pinned colloids, and this heterogeneity can be controlled by changing the fraction of active pinning sites. The melting transition occurs in a single step for $n_p = 0$ or 1, and is considerably broadened for partially pinned samples. We measure the noise fluctuations of the dislocation density as a function of time and find a maximum noise power when $n_p = 0.5$. Signatures of a two step melting process appear for up to 3/4 of the pinning sites removed. We also correlate the regions of high mobility with regions of high dislocation density, and analyze the heterogeneity using the Van Hove correlation function.

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