# Transition of a 2D crystal to a non-equilibrium two-phase coexistence state

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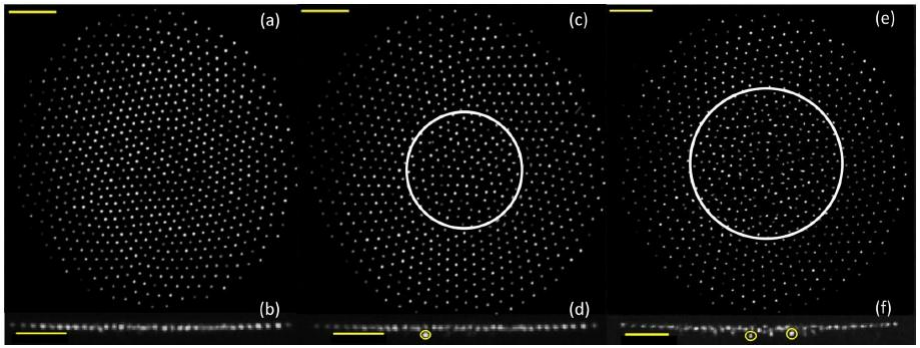


Fig: Top [(a), (c), and (e)] and side [(b), (d), and (f)] views of dusty plasma structures at different discharge conditions. (a) and (b) The top and side views of a typical monolayer crystal at Vd=400 V and p=6 Pa, (c) and (d) the in-plane oscillation state at Vd=400 V and p=5.2 Pa, and (e) and (f) the liquid–solid phase coexistence state with liquid state at the center and crystalline state at the periphery at Vd=400 V and p=4.1 Pa. The encircled particles in (d) and (f) indicate the stray particles. The scale bar in all the subfigures is 1 mm.

In this paper, we present an experimental observation of the transition of a 2D dust crystal to a non-equilibrium solid–liquid phase coexistence state. Initially, a monolayer crystalline structure is formed, which is later transformed to a two-phase coexistence state using the background neutral pressure as a control parameter. Self-excited horizontal oscillations are found in the center of the monolayer prior to the appearance of the coexistence state. It is observed that a molten center coexists with a solid periphery. It is found that melting caused at the core is due to the onset of a localized Schweigert instability in the presence of a few stray particles beneath the top layer in that region.

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