

## **Melting and Premelting of Colloidal Crystals**

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We experimentally studied the melting behaviors of superheated colloidal crystals composed of diameter tunable microgel spheres by video microscopy with single-particle dynamics. The directly visualized nucleation precursors and homogeneous nucleation kinetics deviate from the classical nucleation theory as the degree of superheating increases up to the superheat limit. In the second part, we compared the surface premelting behaviors of monolayer and multilayer colloidal crystals composed of uniaxially attractive particles. The abnormal blocked premelting in monolayer crystals is triggered by a bulk solid-solid transition and terminated by a mechanical-instability-induced bulk melting. These experiments provide the first visualization of homogeneous melting and surface premelting at the single-particle level.

### References:

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