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Surface Premelting Coupled with Bulk Phase Transitions in Colloidal Crystals BO LI, FENG WANG, DI ZHOU, XIN CAO, YI PENG, The Hong Kong University of Science and Technology, RAN NI, Universiteit van Amsterdam, MAIJIA LIAO, YILONG HAN, The Hong Kong University of Science and Technology — Colloids have been used as outstanding model systems for the studies of various phase transitions in bulk, but not at interface yet. Here we obtained equilibrium crystal-vapor interfaces using tunable attractive colloidal spheres and studied the surface premelting at the single-particle level by video microscopy. We found that monolayer crystals exhibit a bulk isostructural solid-solid transition which triggers the surface premelting. The premelting is incomplete due to the interruption of a mechanical-instability-induced bulk melting. By contrast, two- or multilayer crystals do not have the solid-solid transition and the mechanical instability, hence they exhibit complete premelting with divergent surface-liquid thickness. These novel interplays between bulk and surface phase transitions cast new lights for both types of transitions.

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