Mean-field model of melting in superheated crystals based on a single experimentally measurable order parameter (Supplementary Materials)

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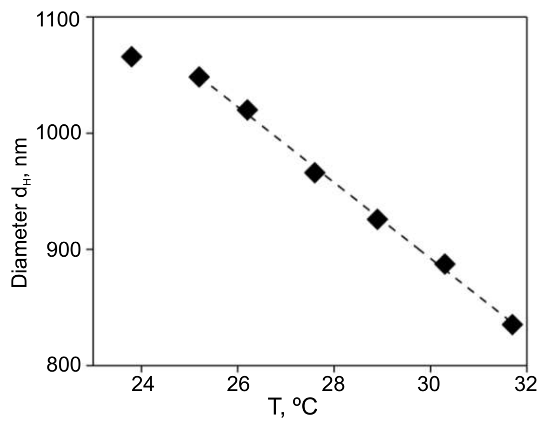

Figure S1. **Temperature dependence of the diameter $d_H(T)$ of NIPAm particles used in the present work:** The laser heating elicits the decrease in the particle diameter and volume fraction.

Supplemental Movie 1 – experimental observation of nucleation and formation of melting front in colloidal crystal.

Supplemental Movie 2 – MD simulation of nucleation and formation of melting front in superheated crystal.

Supplemental Movie 3 – evolution of 2D (cylindrical) subcritical λ^2-fluctuation (nuclei).

Supplemental Movie 4 – evolution of 2D (cylindrical) supercritical λ^2-fluctuation (nuclei).

Supplemental Movie 5 – spontaneous nucleation due to thermal noise (formation of 2D nuclei).

Supplemental Movie 6 – spontaneous nucleation due to thermal noise (formation of 3D nuclei).

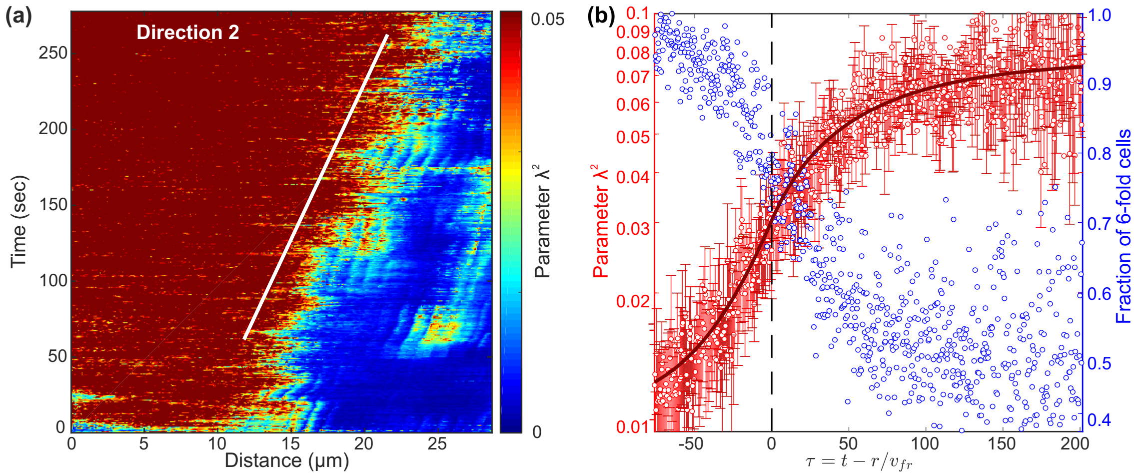

Figure S2. **Experimental self-similar profile of melting front:** (a) Evolution of λ^2 in the radial direction of interest (2) shown in Fig. 2(a) in the main text. (b) Self-similar profile $\lambda^2(\tau)$, the red symbols are experimental points, the red solid line is a fit given by Eq. (9) in the main text. The blue symbols are the fraction of 6-fold cells in the plane of analysis.

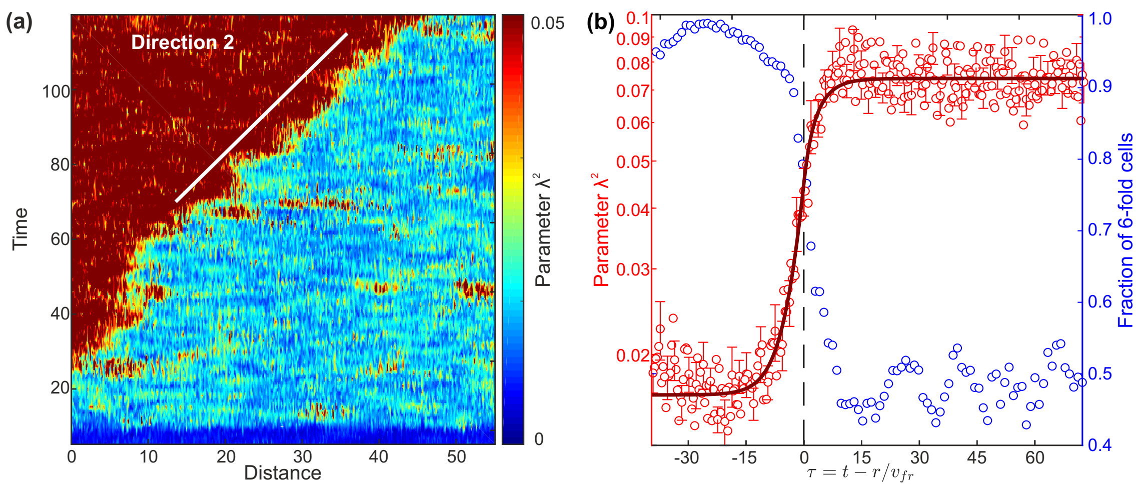

Figure S3. **MD self-similar profile of melting front:** (a) Evolution of λ^2 in the radial direction of interest (2) shown in Fig. 3(a) in the main text. (b) Self-similar profile $\lambda^2(\tau)$, the red symbols are MD points, the red solid line is a fit given by Eq. (9) in the main text. The blue symbols are the fraction of 6-fold cells in the plane of analysis.

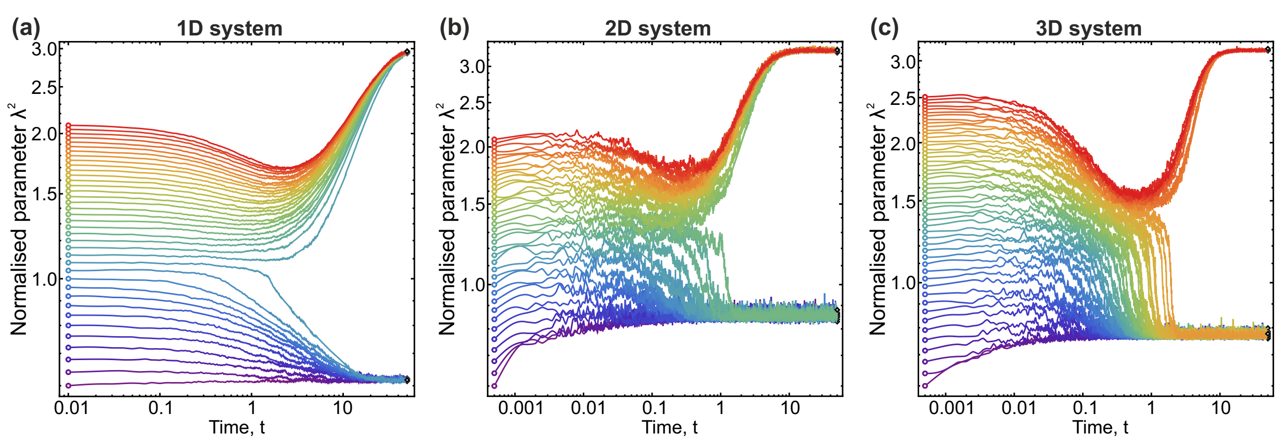

Figure S4. **The typical effect of thermal noise on the evolution of λ^2-field**: $\epsilon = 10^{-4}$ in 1D, 2D, and 3D cases shown in panels (a)-(c), respectively. Other description is the same as in Fig. 4 in the main text.