Electronic Supplementary Information: Diffusion- and reaction-limited cluster aggregation revisited

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Local structure of final aggregates

The local structure of final aggregates does not depend on the volume fraction of the particles initially present in the system. In particular, Fig. 1 demonstrates that, for all interparticle interactions considered, the distribution of the next neighbors of a particle in a final aggregate does not change with the variation of the initial particle volume fraction. Aside from that, Figs. 2 – 4 show that, while the radial distribution function $g(r)$ varies with the initial density, the pair distribution function $\varphi g(r)$ is locally independent of the particle concentration. Evidently, this independence is realizable only on the length scales on which the aggregates do not overlap. In computer simulations, the occurrence of such overlaps is indicated by the deviation between the pair distribution functions computed with and without employing periodic boundary conditions. Another indication for the onset of percolation is the saturation of the radial distribution function $g(r)$ to unity at length scales comparable to the half of the simulation box size. At intermediate length scales, however, the radial distribution function evolves according to

$$g(r) \propto r^{d_f - d} \tag{1}$$

and can be used to determine the fractal dimension of the structure from the fit of the scaling function to the data in the scaling region. In this work, we used another method described in the main text but demonstrate, in Figs. 2 – 4 , that the scaling regime is clearly visible.

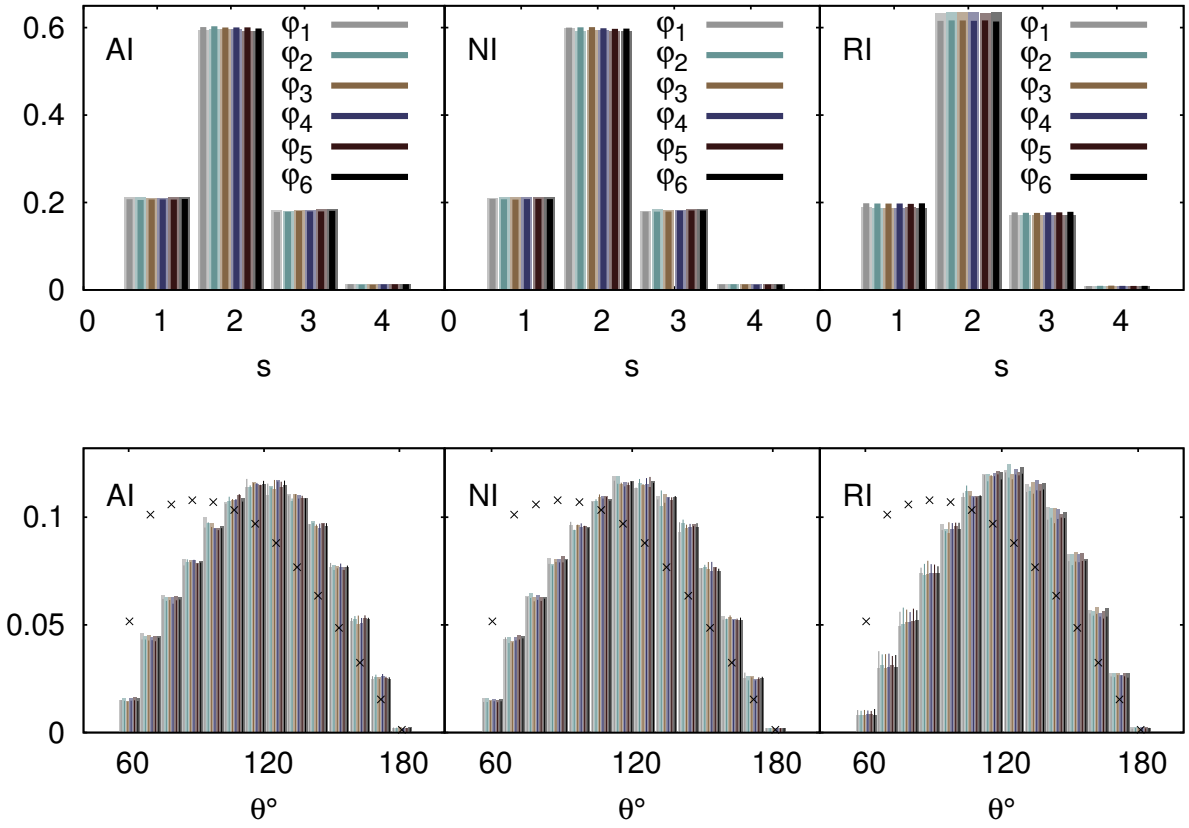

Fig. 1 Distribution of the numbers of next neighbors of each particle (top row) and of the angles between the vectors connecting a particle ($s = 2$) with its next neighbors (bottom row) in the final aggregates formed by attractive (left), repulsive (right), and non-interacting (middle) particles at $T = 0.8$ (shaded boxes) and $T = 1.2$ (solid impulses). Crosses stand for the random distribution truncated at $\theta = 60°$.

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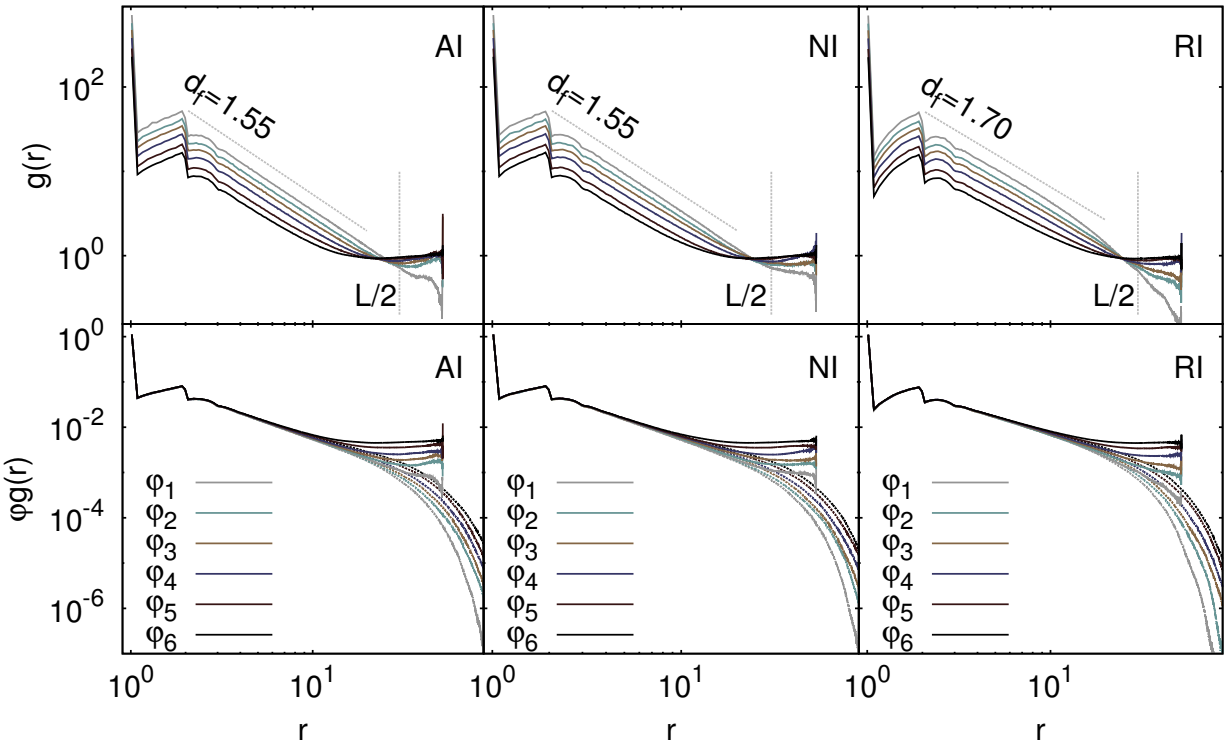

Fig. 2 Radial (top row) and pair (bottom row) distribution functions for the final aggregates formed by attractive (AI), repulsive (RI), and non-interacting (NI) particles at $T = 0.8$. Top row: Vertical dotted lines indicate the dimension of the simulation box, $L/2$. Straight dotted lines demonstrate, at intermediate length scales, the scaling of the pair distribution functions given by Eq. 1 . Bottom row: Pair distribution functions computed with (solid lines) and without (broken lines) periodic boundary conditions.

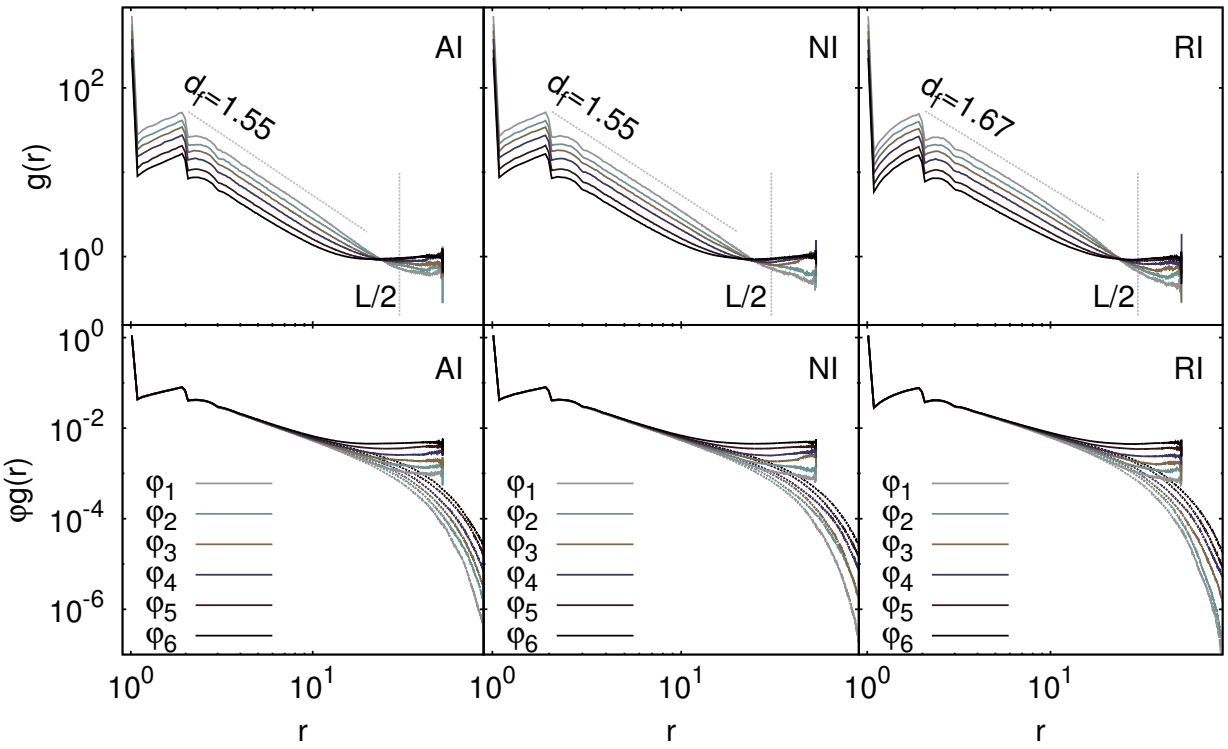

Fig. 3 Same as Fig. 2 but for $T = 1.0$.

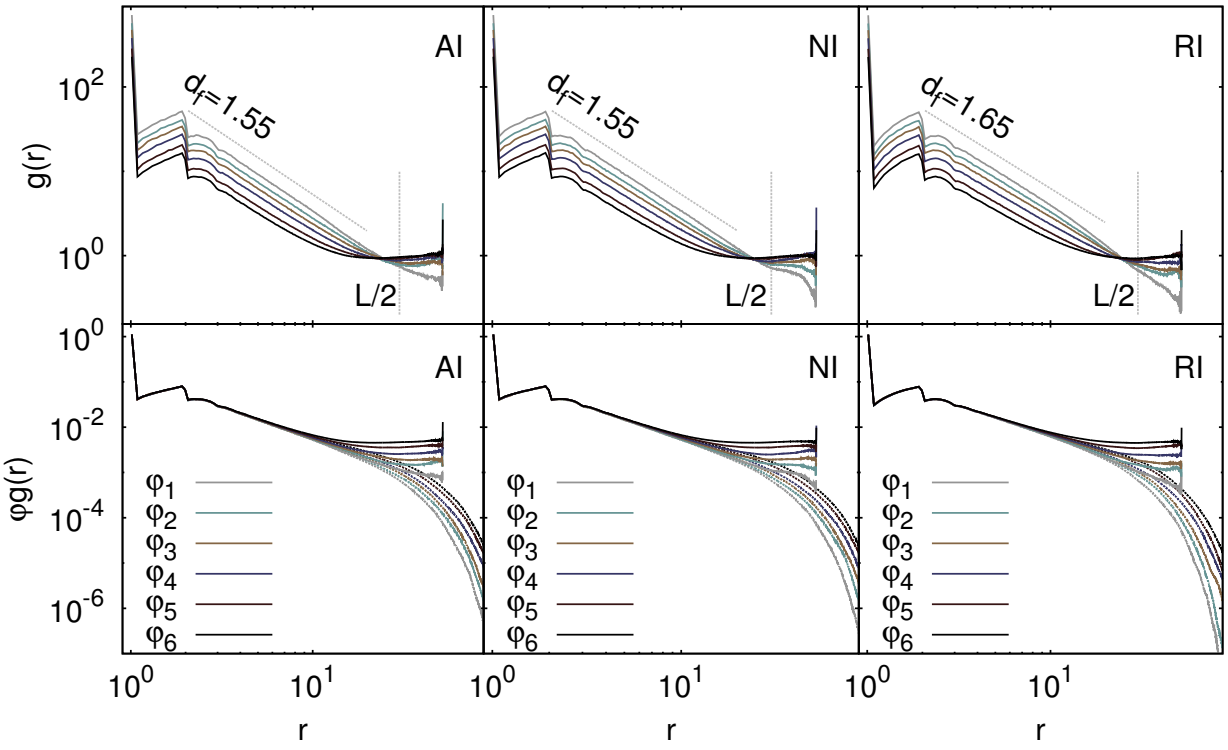

Fig. 4 Same as Fig. 2 but for $T = 1.2$.