EFFECTS OF PARTICLE INTERACTION ON THE STRUCTURE OF DEPOSITS IN TWO-DIMENSIONAL SYSTEMS

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S u m m a r y

A general competitive model of deposit formation based on the combination of the random sequential absorption deposition (RSAD), ballistic deposition (BD), and random deposition (RD) models is proposed. This model named as $\mathrm{RSAD}_{1-s}(\mathrm{RD}_f\mathrm{BD}_{1-f})_s$ allows one to consider different cases of interparticle interactions from complete repulsion between near-neighbors in the RSAD model ($s = 0$), sticking interactions in the BD model ($s = 1, f = 0$), or the absence of interactions in the RD model ($s = 1$, $f = 0$). An ordered structure of the ideal chessboard type was observed for the pure RSAD model ($s = 0$) in the limit of $h \to \infty$. At small h, defects in the ordered structure are observed. The concentration of these defects decreases with increasing h in accordance with the critical law $\rho \sim h^{-\chi_{\mathrm{RSAD}}}$, where $\chi_{\mathrm{RSAD}} \approx 0.31 \pm 0.02$. The packing coefficient p versus system size L was investigated and the scaling parameters and values of $p_\infty = p(L = \infty)$ were determined. Dependences of p versus the parameters of a competitive model, s and f, were studied. The anomalous behaviour of the packing coefficient p_∞ with changing the interparticle repulsion was observed, that goes through the minimum with changing the parameter s.