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Role of Diffusion in Scaling of Polymer Chain Aggregates Found in Vapor Deposition Polymerization[1] SAIRAM TANGIRALA[2], DAVID LANDAU[3], The University of Georgia — Linear polymer chain aggregates grown by 1+1D Monte Carlo simulations of vapor deposition polymerization (VDP) were studied. The behavior of chain length distribution $n_s(t)$ as a function of chain length (s) and deposition time (t) was examined for relevant model parameters. The scaling of $n_s(t)$ was found to be sensitive to the ratio $G = D/F$ of deposition rate (F) and free monomer diffusion (D). A systematic approach is presented to isolate the dependence of $n_s(t)$ on t, s, and G. We found power law dependence of $n_s(t)$ on t with exponent $\omega = 1.01 \pm 0.02$ that was invariant with changes in G. For small s and deposition time of $t = 1 \times 10^3$, 5×10^3, and 10×10^3, $n_s(t)$ showed a power-law decrease with s and exponent $\tau = -0.58 \pm 0.02$. We observed a strong influence of G on the rescaled $n_s(t)$ data that prevented the manifestation of unique scaling function for varying G. The dependence of scaling function of $n_s(t)$ on G was found to be a characteristic of VDP and elucidates the sensitivity of polymer chain aggregates to G.

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