Simulated Conformality of ALD Growth Inside Lateral HAR Channels: Comparison Between a Diffusion–Reaction Model and a Ballistic Transport–Reaction Model

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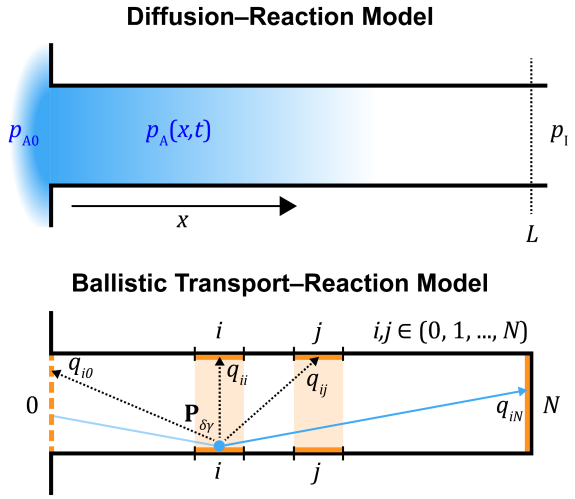

Figure 1. Simplified schematic depicting how the models treat particle transport inside the lateral high-aspect-ratio channel. The diffusion–reaction model [1,2] (upper) uses the diffusion equation to determine the partial pressure of the reactant, while the ballistic transport–reaction model [3,4] (lower) calculates reactant fluxes between discretization sites using a probability matrix based on the channel geometry.

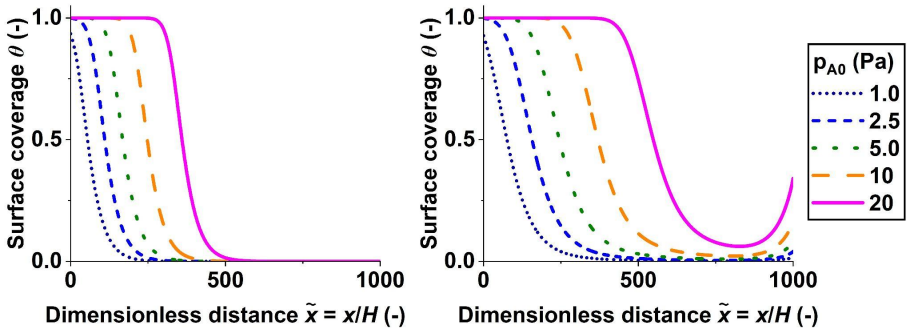

Figure 2. Saturation profiles showing the evolution of the surface coverage with penetration into the channel in the diffusion–reaction model [1,2] (left) and the ballistic transport–reaction model [3,4] (right). The initial partial pressure of the reactant was varied as indicated in the legend, while the other simulation parameters were as follows: T = 573.15 K, p_l = 0 Pa, M_A = 0.1 kg/mol, M_l = 0.028 kg/mol, M_{film} = 0.05 kg/mol, H = 0.5 µm, W = 0.01 m, L = 500 µm, t_{end} = 1 s, c = 0.001, P_d = 0.0001, q = 4 nm^{-2}, s_0 = 0.25 nm^2, ρ = 3500 kg/m^3, b_A = 1, b_{film} = 1, d_A = 0.6 nm, d_l = 0.4 nm, Φ_p = 2 and Φ_s = 4.

References

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