Simulated conformality of ALD in lateral high aspect ratio channels: Impact of Knudsen number on the saturation profile

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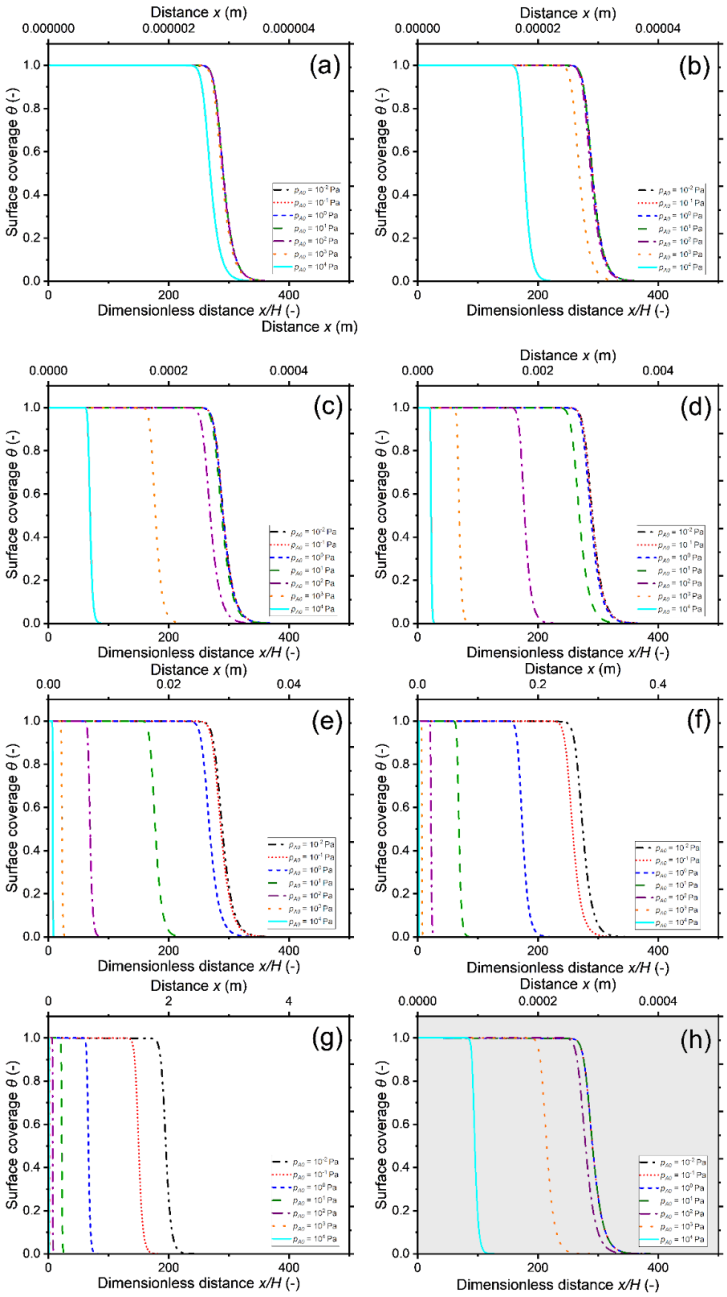

Figure 1: Surface coverage profiles in lateral high-aspect-ratio channels, simulated with the Ylilammi et al. [1,2] model at constant reactant exposure of 10 Pa·s. The simulations are for different channel heights (a) 10 nm, with *Kn* 10^{0} to 10^{6}, (b) 100 nm, with *Kn* 10^{-1} to 10^{5}, (c) 1 µm, with *Kn* 10^{-2} to 10^{4}, (d) 10 µm with *Kn* 10^{-3} to 10^{3}, (e) 100 µm with *Kn* 10^{-4} to 10^{2}, (f) 1 mm, with *Kn* 10^{-5} to 10^{1}, (g) 1 cm, with *Kn* 10^{0} to 10^{-6}, (h) 500 nm, with *Kn* 10^{-2} to 10^{4}. To maintain a constant exposure of 10 Pa·s, the time was varied in the range of 10^{-3} to 10^{3} s and the initial reactant partial pressure in the range of 10^{-2} to 10^{4} Pa. Parameters that were kept constant: T = 250 °C, $p_I = 9 \times p_{A0}$, d_A = 6×10^{-12} m, $d_I = 3.4 \times 10^{-12}$ m, M_A = 0.0749 kg/mol, M_I = 0.03994 kg/mol, L = 500 µm W = 1 cm $P_d = 10^{-4}$ s^{-1}, $c = 10^{-2}$, q = 4×10^{18} m^{-2}, N = 1. The panel (h) with the grey background (H= 500 nm) corresponds to the typical PillarHall™ case [2].

References

[1] M. Ylilammi, O.M.E. Ylivaara, and R.L. Puurunen, J. Appl. Phys., 123, 205301, (2018).

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