Smoothing of surfaces by atomic layer deposition and etching

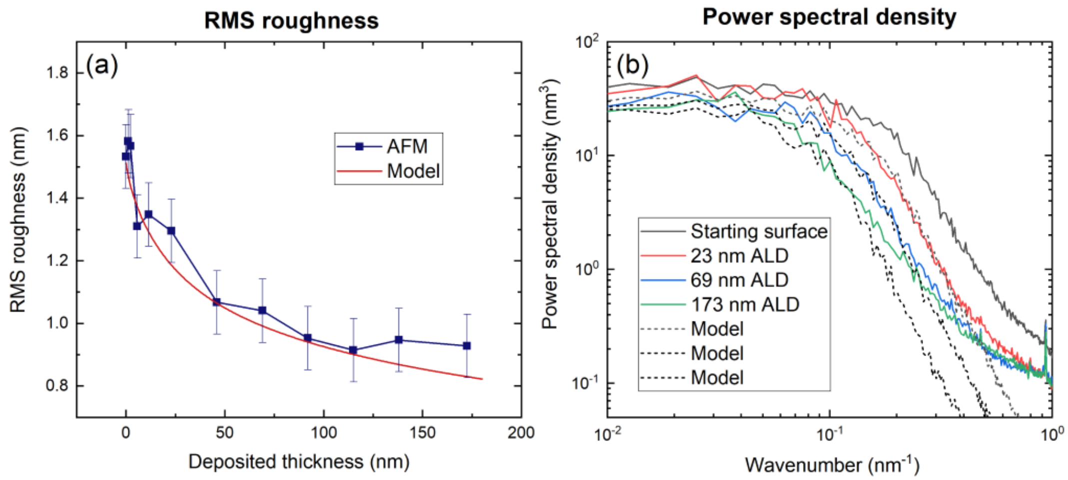

Fig 1: (a) Roughness as a function of deposited thickness for Al_2O_3 on 47 nm ZnO compared to the uniform front propagation model. (b) Power spectral density from AFM measurements compared to simulations for different deposited thicknesses. At high wavenumbers the results deviate due to contributions of electronic noise.

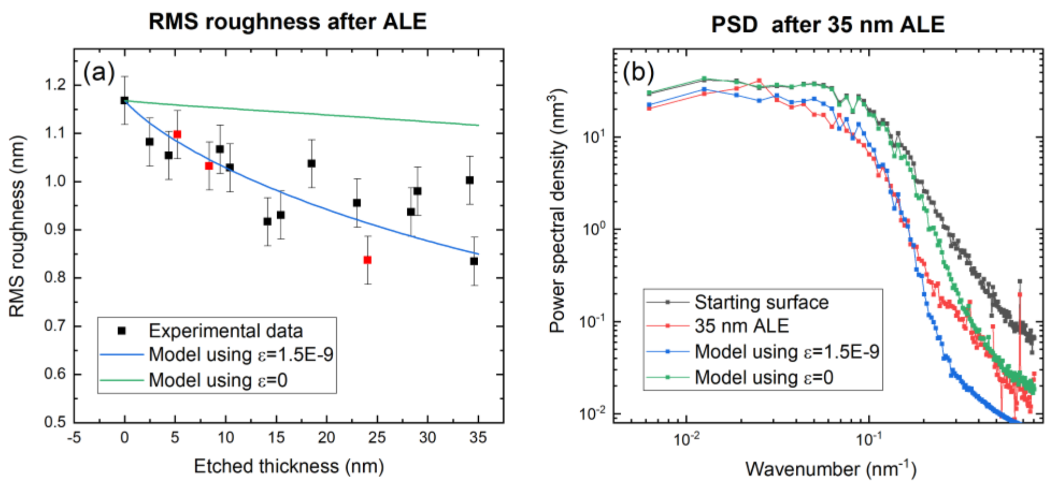

Fig 2: (a) Roughness as a function of etched thickness for Al_2O_3 on 47 nm ZnO compared to the uniform front propagation model with and without the inclusion of a diffusion term ε. (b) Power spectral density for the starting Al_2O_3 film on 47 nm ZnO (black), after 35 nm ALE (red) and the model data with diffusion term (blue) and without (green). These results illustrate that to model ALE accurately both uniform front propagation and curvature-dependent fluorination must be considered.

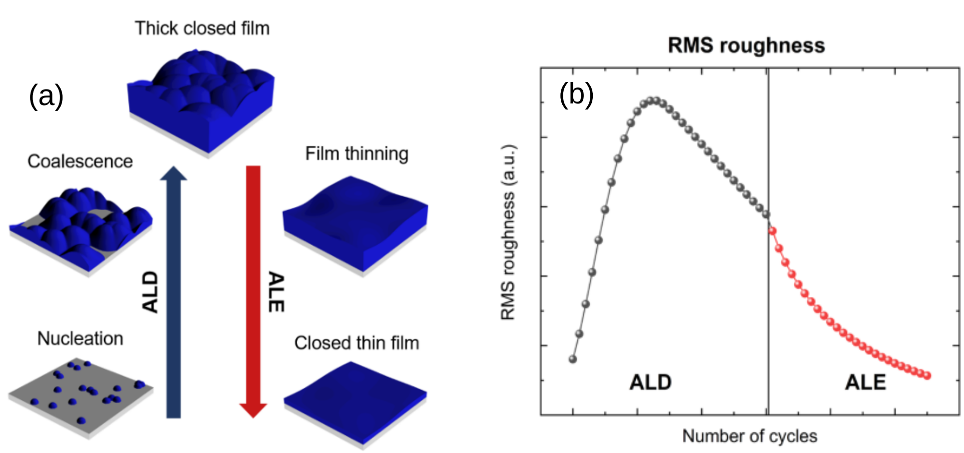

Fig 3: (a) Simulation of how a thin closed film can be achieved using combined ALD + ALE processing.[1] (b) RMS roughness as a function of ALD and ALE cycles. By combining ALD + ALE ultrathin films with low roughness can be achieved.

(1) *George et al., Acc. Chem. Res.* **53**, 6, 1151–1160 (2020)