

Acetic Acid-Modulated Al_2O_3 Atomic Layer Deposition on Monolayer MoS_2 for Controlled Nucleation

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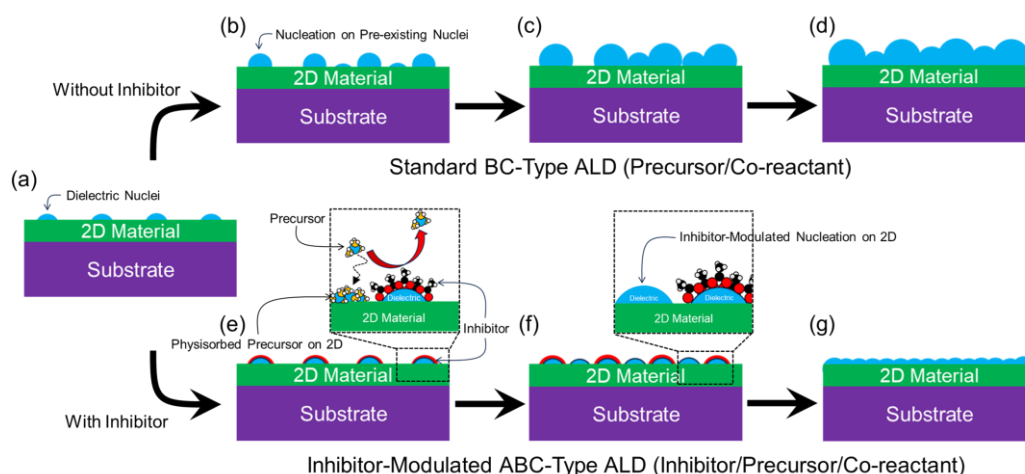


Figure 1. Idealized schematics of inhibitor-modulated nucleation control during thermal ALD on a 2D material. (a) After incubation, nascent nuclei form. (b–d) In standard BC-type ALD, growth concentrates on existing nuclei, causing island coarsening and delayed film closure. (e–g) In ABC-type ALD, the inhibitor caps nuclei, suppressing their growth and redirecting precursor adsorption to uncovered surface sites, enabling earlier film closure and smoother morphology.

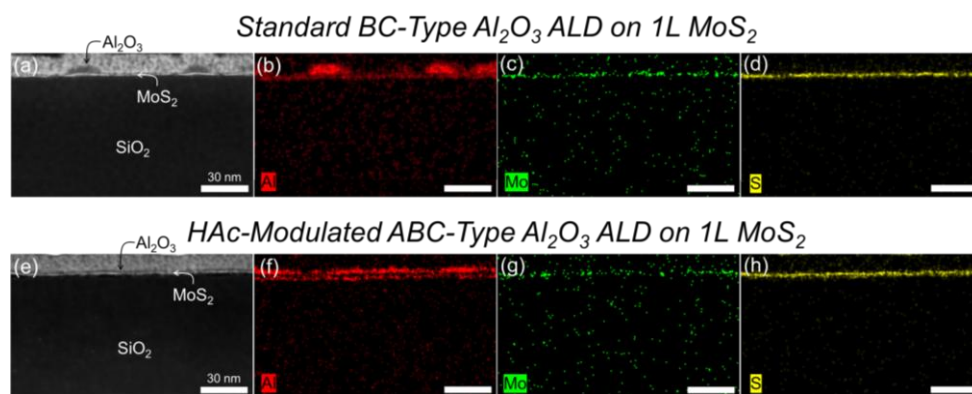


Figure 2. Cross-sectional HAADF-STEM and EDS analyses after 50 cycles of Al_2O_3 ALD on 1L MoS_2 . (a–d) show the standard BC-type process and (e–h) the HAc-modulated ABC-type process. For each, HAADF-STEM images ((a) and (e)) are paired with EDS maps of Al (red), Mo (green), and S (yellow). Scale bars: 30 nm.