

Isotropic Plasma ALE of Al₂O₃ using SF₆ Plasma and TMA - Supplementary Figures

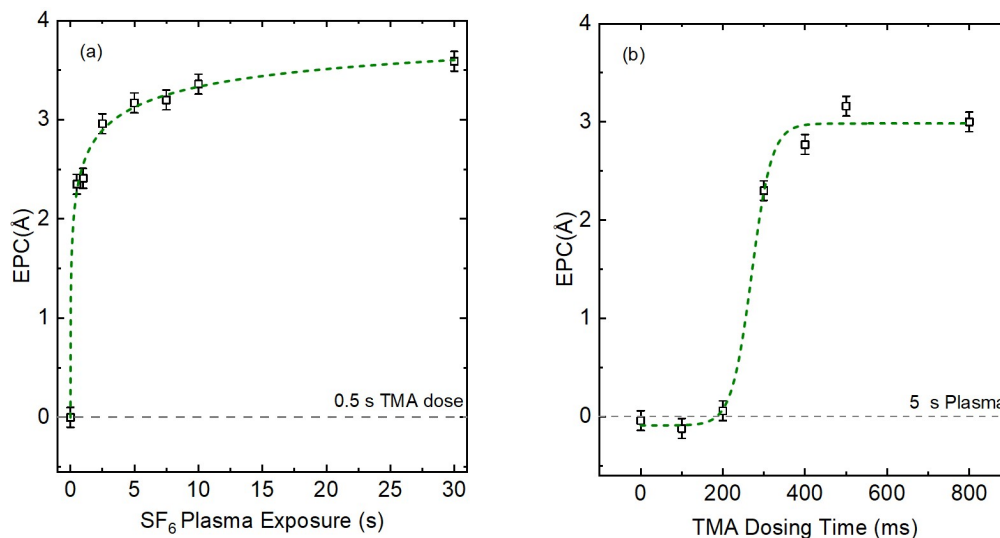


Fig 1: Saturation curves for (a) SF₆ plasma exposure and (b) TMA dosing during Al₂O₃ ALE. Both experiments were conducted at 300 °C table temperature, using an ICP power of 100 W, 30 s purges and 10 s TMA hold step. Saturating behavior is observed in both steps. The green lines are guides for the eye.

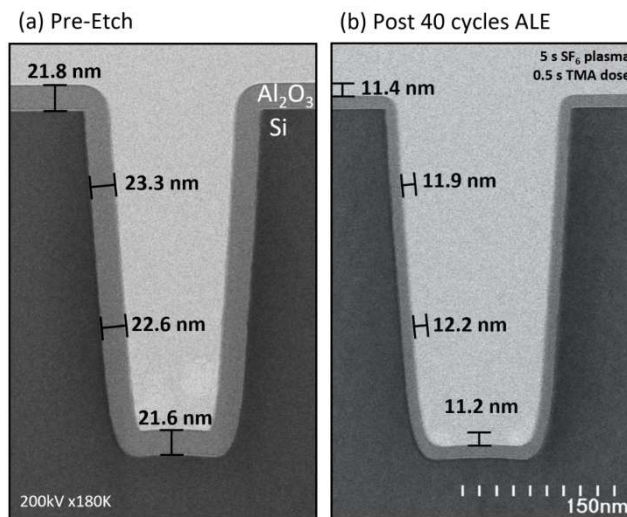


Fig 2: Cross-sectional TEM images of Al₂O₃ deposited on 3D Si trench structures. (a) Trench structure coated with an Al₂O₃ film grown by plasma ALD, in which film thickness in each region is highlighted. (b) The same trench structure after 40 ALE cycles, in which the thickness etched away in each region is highlighted. The observed etch rate is in good agreement with the EPC determined for planar samples.

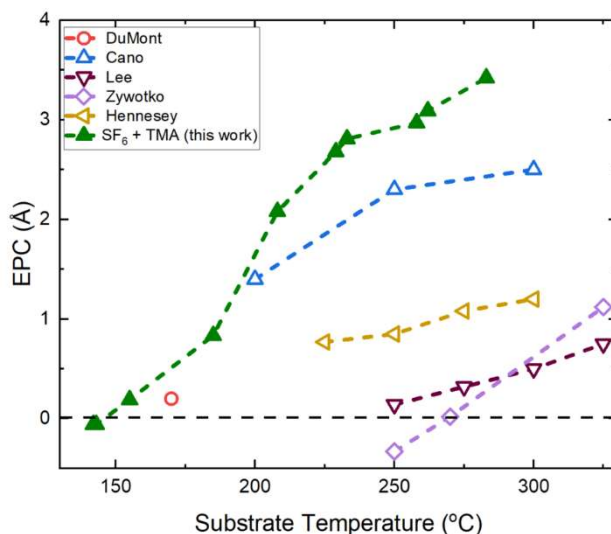


Fig 3: Comparison of literature values of etch per cycle (EPC) for thermal HF/TMA processes²⁻⁶ and the SF₆ plasma/TMA process outlined here. Temperatures reported from this work are measured using in-situ spectroscopic ellipsometry, while the literature values are the reported set point temperatures. Substrate temperature values from literature may deviate depending on process conditions and reactors used. The EPC values for the plasma ALE process are higher over this temperature range when compared to the thermal HF/TMA processes.