

Figure 1: Synergy plot for Hhfac/H<sub>2</sub> plasma ALE of Al<sub>2</sub>O<sub>3</sub>, showing film thickness change as a function of cycles. Dosing only Hhfac or H<sub>2</sub> plasma results in minimal changes in thickness. When alternating dosing Hhfac and H<sub>2</sub> plasma, there is a linear reduction in film thickness with an EPC of 0.17 nm/cycle.

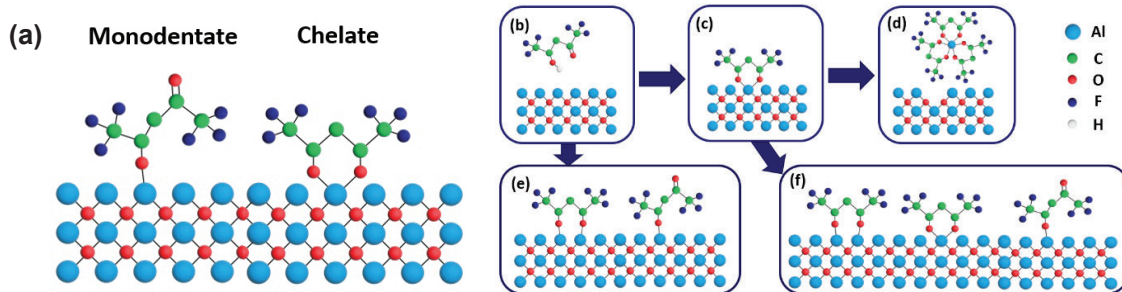


Figure 2: (a) The different Hhfac binding configurations. (b-d) On a bare surface, Hhfac can bind in chelate configuration and etch away the film if three hfac species bind to the same metal atom. (e) As molecules bind in monodentate configuration the surface becomes blocked and etching stops. (f) Surface coverage of monodentate hfac increases such that isolated chelate species start to contribute to surface blocking as adjacent species sterically hinder etching.

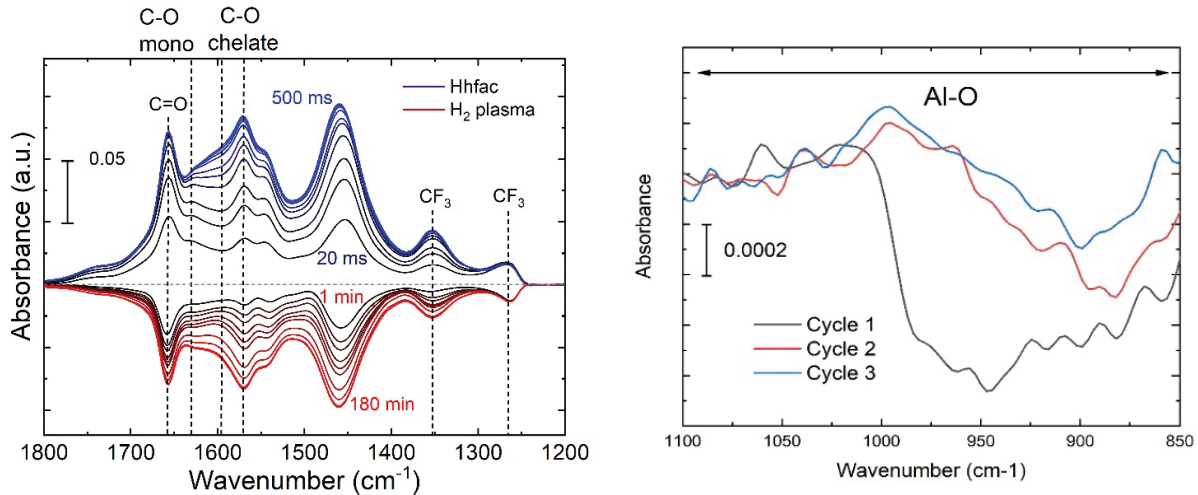


Figure 3: (a) FTIR absorbance spectra for Hhfac adsorption (blue) referenced to the initial Al<sub>2</sub>O<sub>3</sub> film and removal with H<sub>2</sub> plasma (red) referenced to the surface after Hhfac adsorption. (b) Spectra referenced to the previous cycle for three ALE cycles. A decrease is observed in the Al-O absorbance band for each ALE cycle, indicating that removal of AlO bonds is occurring.