

Figure 1. Schematic for thermal  $\text{Si}_3\text{N}_4$  ALE based on (A) oxidation; (B) fluorination; and (C) ligand-exchange and conversion.

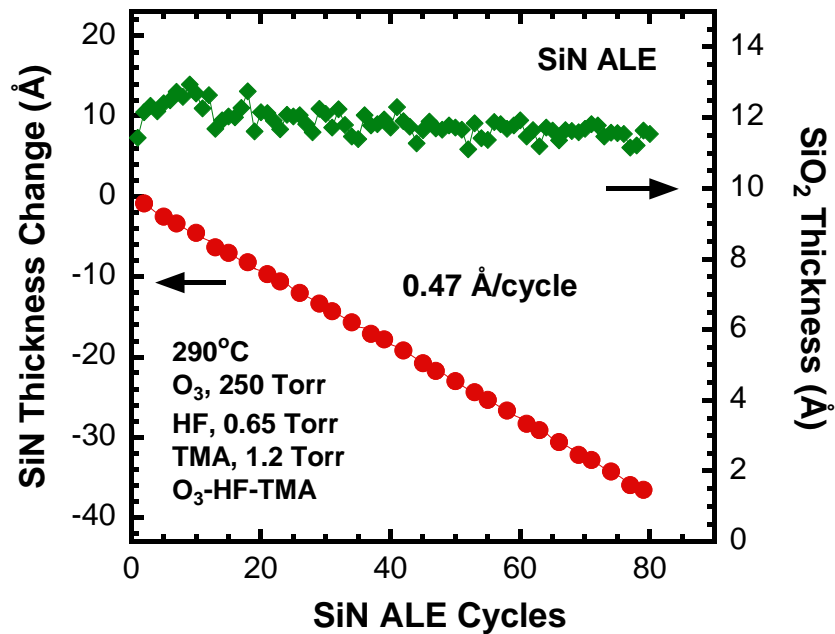


Figure 2.  $\text{SiO}_2$  and  $\text{Si}_3\text{N}_4$  film thicknesses during thermal ALE at 290°C using sequential exposures of  $\text{O}_3$ , HF and TMA. The  $\text{SiO}_2$  film thickness remains nearly constant while the  $\text{Si}_3\text{N}_4$  film thickness is reduced at  $0.47 \text{ \AA/cycle}$ .