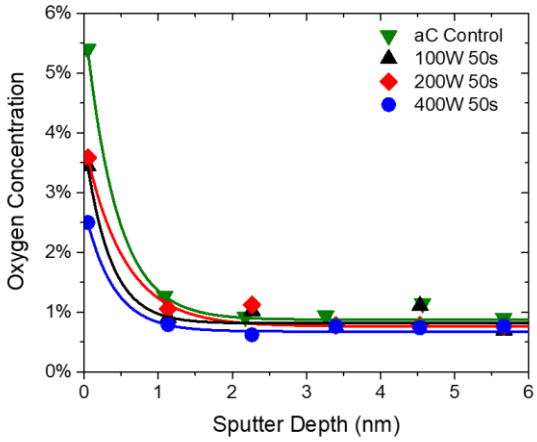

Figure 1: Oxygen depth profiles determined by XPS depth profiling of 100 nm aC films deposited on Si wafers, both treated (100W 50s black triangles, 200W 50s red diamonds, 400W 50s blue circles) and untreated (green triangles). The initial surface scan, i.e., zero sputter depth, shows higher oxygen concentration than that obtain after ~1-2 nm Ar sputtering into the aC film. Plasma treatments reduce surface oxygen content but do not inhibit partial reoxidation when exposed to air.

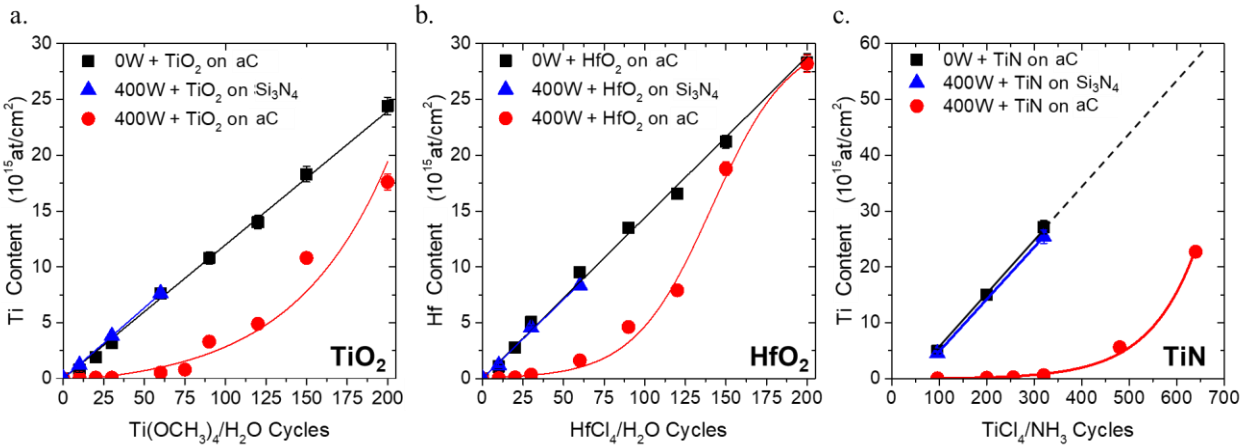

Figure 2: Ti or Hf content from RBS, in units of atoms/cm^2, obtained after ALD growth on untreated aC (black squares), plasma-treated Si_3N_4 (blue triangles), and plasma-treated aC (red circles) substrates for a) TiO_2 by $Ti(OCH_3)_4/H_2O$ at 250°C b) HfO_2 by $HfCl_4/H_2O$ at 300°C c) TiN by $TiCl_4/NH_3$ at 390°C. The black dotted line shown for c) is an estimation of the Ti content for greater than 320 cycles of $TiCl_4/NH_3$.

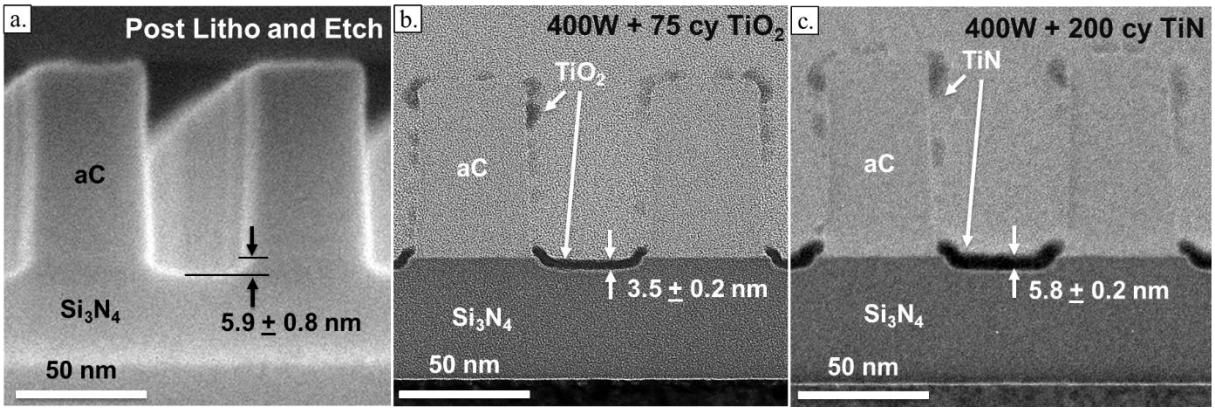

Figure 3: a) SEM image of the unprocessed, 90nm pitch, aC/Si_3N_4 patterned substrate after lithography and etch steps, showing a recess into the Si_3N_4 layer of ~5-7nm. Pattern dimensions for a) and b) were aC line CD of 45 nm, height of 70 nm, and Si_3N_4 trench width of 45 nm. TEM images of patterned substrates subjected to b) 400W 20s H_2 plasma-treatment followed by 75 cycles of TiO_2 ALD at 250°C and c) 400W 20s H_2 plasma-treatment followed by 200 cycles of TiN ALD at 390°C (aC line CD of 40 nm, height of 80 nm, Si_3N_4 trench width of 50 nm). All scale bars are 50 nm