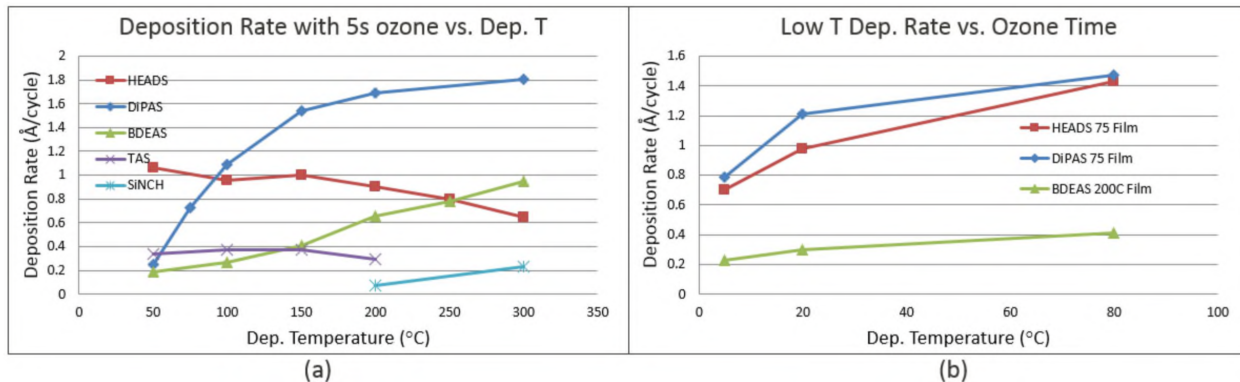

Figure 1: (a) The deposition rates of selected precursors as a function of deposition temperatures (b) The deposition rate of selected precursors at different ozone time at 75ºC

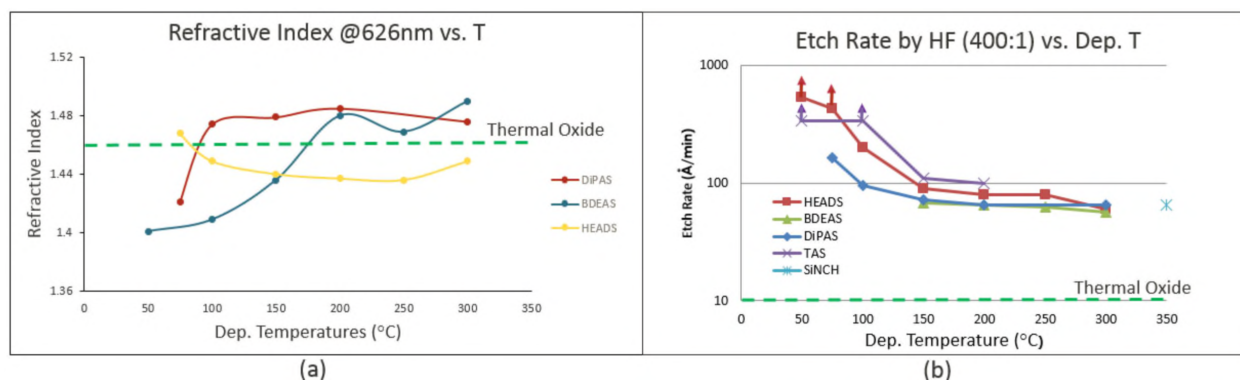

Figure 2: (a) The film refractive index at 626nm at different temperatures (b) The etch rates of films deposited at different temperatures, the ozone time was set 5s during the process

As shown in Figure 2 (a), films deposited from DiPAS, BDEAS and HEADS at temperatures over 150ºC all have a refractive index close to that of thermal oxide. The refractive index of the films is also a function of ozone pulse time; long ozone pulse times may be able to reduce the film impurity and densify the films deposited at lower temperatures.

At 25ºC, thermal oxide has a etch rate around 10Å/min. Films deposited from HEADS, BDEAS, and DiPAS at 150°C or above show similar etch rates, around 6 times faster than that of thermal oxide. All films deposited at lower temperatures have dramatically higher the etch rates. The etch resistance of films deposited at lower temperatures can be improved by increasing the ozone pulse time. For DIPAS film deposited at 75°C, the etch rate can be reduced from 163 Å/min to 86 Å/min by increasing ozone time from 5s to 40s. For HEADS film deposited at 75°C, the etch rate can be reduced from over 430 Å/min to 194 Å/min by increasing ozone time from 5s to 80s.

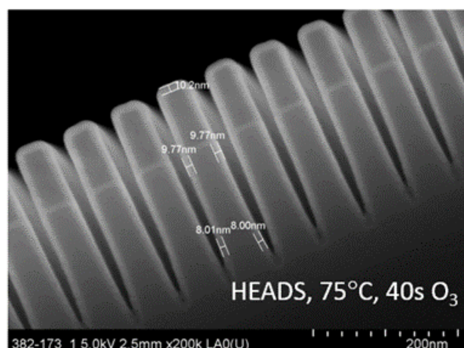

Figure 3: The step coverage results of HEADS film deposited at 75°C with 40s of O_3 time

DiPAS, BDEAS and HEADS films deposited at high temperatures (e.g. 300°C) all show close to 100% step coverage. As temperature drops, the step coverage drop as well. However, for HEADS, given long enough ozone time, the step coverage performance can be improved back to more than 80% as shown in Figure 3.