Understanding plasma etch mechanism of Low-k materials under low temperature substrates with fluorine-based precursors

Plasma etching of ultra-low-k materials at aggressive back end of line (BEOL) nodes has become increasingly challenging as plasma induced damage becomes a significant challenge to overcome. Conventional reactive ion etch (RIE) processes usually occur at room temperature or higher which diffusion of radicals will damage low-k materials surface. Alternatively, to limit diffusion mechanisms and prevent damage, low temperature cooling of a substrate can be used. The purpose of this research is to understand how to leverage these low substrate temperatures for dielectric etch applications.