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Plasma Processing for Advanced Interconnects

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As the critical dimensions of interconnects for advanced semiconductor devices have entered the sub-100nm regime, the interactions of materials with their processing environments have become increasingly important. Modern ultralow-k (ULK) dielectric materials are particularly sensitive to damage caused by exposure to electrons, ions, reactive neutrals and UV radiation during their deposition, patterning, and characterization. This presentation will follow the "plasma processing life cycle" of a typical ULK film sample, from deposition through etching and metallization. Particular attention will be paid to damage of the film during etching and the associated structural characterization. Trends of plasma damage with dielectric constant and composition will be described. Finally, the long-term outlook for patterning ULK films to the "end of the roadmap" will be discussed.