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### **Plasma Science in Semiconductor Manufacturing**

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Plasma processes are ubiquitous in semiconductor manufacturing. In CMOS manufacturing alone, plasma processes play a significant role in the industry meeting gate patterning resolution limits and interconnect density targets so that Moores Law is followed. Related to fusion and space plasmas, technological plasmas in semiconductor manufacturing are more often than not low temperature non-equilibrium plasmas associated with fluorescent lamps and lasers. It is the high electron temperature (electron volt order), low heavy species temperatures and conformal electric field skin shielding surfaces from plasmas in a conformal manner that enable low temperature non-equilibrium plasmas to be used to etch and deposit material into all manner of materials and geometries for the fabrication of electronic devices. In addition to experiment, complex mix of plasma chemistry, plasma dynamics and materials interaction models are required to describe how plasmas are used to fabricate electronic devices. Fortunately, plasma science has drawn on years of research related to plasmas for lighting, beam plasmas and gas insulators to build a comprehensive set of numerical and diagnostic capabilities based on which plasma processes can be engineered. The state of plasma science in semiconductor manufacturing will be discussed including plasma sources for EUV lithography, plasmas for displays, plasma deposition of novel materials such as nanotubes, and purely neutral plasma processes.