Some Aspects of Process Development in Plasma Etching

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Process development for plasma etching, which must go together with productivity improvement, is tofind a multi-dimensional solution for a nonlinear dynamic plasma processing chamber. Process development in plasma etching, which is a phase transition from solid to vapor, is the fruit from the convergence technology among electromagnetics, fluid dynamics, thermodynamics, and (reaction, discharge)kinetics. Process development is to understand the overall phenomena that occur in the processingchamber. Some prerequisite steps such as understanding of processing chamber in terms of H/W, S/W and plasma stability are needed for efficient processdevelopment. Before any recipe is developed, understanding of a given processing chambersuch as equipment constants, process kit, the steady state chamber condition and proper seasoning is crucial to process development. Residence timeconcept which holds for poly and metal etching is useful for proper process development. Relationship between the process parameters andthe residence time is a must for better process development. Process baseline based on process spec. is obtained after critical hurdles are ruledout. The “plasma processing chamber”–called a black box –should be looked into detail using several governing equations for better process understanding.