MECHANICAL ENGINEERING COLLOQUIUM

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224 MEC DEPT.

Nanoparticle Detachment from Surfaces Using Shockwaves

Dr. A. Kadaksham

Project engineer

International SEMATECH

Albany, NY 12203

The problem of nanoparticle adhesion and removal from substrates is a challenging one at the sub 100 nm particle sizes, since the removal forces become insufficient in overcoming the van der Waals force of adhesion and thus removing particles at the above sizes. Traditionally, the semiconductor industry has relied on a combination of chemical and hydrodynamic forces to remove particle defects from substrates of interest. Chemicals are used to etch the surface and particles and thereby break the bond between the two, and hydrodynamic force is used to carry the particles away from the surfaces. As an alternative to chemical etching, strong shockwaves generated in air and liquid can be used to detach the particles from surfaces. Here, the feasibility of several methods of shockwave generation, their relative merits and efficiency of particle removal, and the particle removal limits are presented.

BIOGRAPHY

Dr. Arun John Kadaksham is a project engineer at International SEMATECH which is a leading research consortium for the semiconductor industry. His primary focus in this position is nanoparticle defect reduction for enabling next generation lithography, namely extreme ultraviolet lithography (EUVL). Enabling this technology for production requires that, defects on the order of 10 nm be removed from EUV mask blanks and patterns. Prior to this Dr. John Kadaksham held positions as a post doctoral research associate at SEMATECH and also at Clarkson university, where his research was mainly focused on nanoparticle adhesion and removal. He has also held several consulting positions in design and engineering firms, early in his career. Dr. John Kadaksham received Ph.D. in Mechanical Engineering from New Jersey Institute of Technology in 2005.

For More Information Contact: Prof. Pushpendra (973) 596-3326, singhp@njit.edu