1. Title:	Plasma-Assisted Electrostatic Cleaning of EUV Masks
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3. Abstract body:

Plasma Assisted Cleaning by Electrostatics is a dry-cleaning process that uses substrate-particle charge imbalance as well as trapped surface charge to propel contamination off the surface. Through using an electron gun and a weak local plasma to charge the particles, satisfactory charge imbalance can be accumulated for removal. Charging the particles produces an image charge on conducting substrates, however utilizing a high flux density of electrons, the image charge is partially screened allowing for the electrostatic repulsion necessary to remove contaminants. This electrostatic repulsion can be further increased by pulsing the plasma. When the plasma is turned off, electrons quickly exit the plasma leaving the heavier ions behind and momentarily increases the contamination's charge in the presence of an electric field. The benefit of PACE is the quickness in which a surface may be processed since the entire surface can be cleaned at once. Results of cleaning 30nm polystyrene latex (PSL) spheres from Si wafers showed nearly complete removal. Recent tests on chrome on quartz patterned masks has shown no pattern damage. Cleaning of silicon, quartz, and ruthenium coated quartz substrates and damage assessment of features will be reported for the removal of Si_3N_4, Al_2O_3, PSL's, and Au nanoparticles.