

Nanoparticle Control in EUVL Systems

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DESCRIPTION OF WORK

- ◆ Develop protection schemes to prevent nanoparticle contamination
- ◆ Performed experiments at low pressure down to 10 mTorr
- ◆ Injected 10 nm to 300 nm standard nanoparticles at known speed and known concentration into the vacuum system
- ◆ Mounted photomasks inside the chamber
- ◆ Investigate thermal phoretic protection by heating the photomasks
- ◆ Developed analytical and numerical models to compare with experiments
- ◆ Study diffusional behavior of nanoparticles in vacuum (large Kn range)
- ◆ Sponsored by Intel Corporation and by German Science Foundation

PUBLICATIONS

- ◆ Asbach et al. (2005) *Appl. Phys. Lett.* 87:234111.
- ◆ Kim et al. (2006) *J. Vac. Sci. Technol.* A24(2):229-234.
- ◆ Engelke, et al. (2007) *J. Electrochemical Society* 154:H170-H176.

MAJOR OBSERVATIONS

- ◆ Thermophoresis is effective in preventing nanoparticle deposition on photomasks
- ◆ Good agreement was found between experimental results and theoretical results, i.e., DSMC simulations and a simple analytical model, in treating simple geometry

