
Mechanism Analysis of NH₃/NF₃ Remote Plasma Dry Cleaning Reactions Using TOF-MASS

Jiheon Kim ¹, Shin Kim ¹, Kyoungwoo Kwon ¹, Byeonghwa Jeong ¹, Kiyoung Yun ¹, Seoungki Chae ², and
Kyunghwan Jeong ²

¹ULVAC KOREA,Ltd, Korea, Republic of

²SUNGKYUNKWAN UNIV., Korea, Republic of

Recently, chemical dry cleaning process technique using NF₃, NH₃ has been introduced into memory fabrication industry to remove the surface native oxide selectively in the name of chemical oxide removal(COR) or native oxide removal(NOR) . NOR prior to poly-Si contact and epitaxial growth of Si is the most critical technology to ensure process and device performances of poly-Si plugs and selective epitaxial growth (SEG) layers for DRAM, flash memory, and logic device. In this time, dry cleaning process for interfacial oxide removal has attracted a world-wide attention due to its superior passivation properties to conventional wet cleaning processes.

Therefore, we have researched a chemical reaction about etchant, NH₃ and NF₃ in batch type dry cleaning equipment using TOF-MASS. Batch type dry cleaning equipment using Remote plasma needs native oxide etching with NH₃, NF₃ and N₂ which is carrier gas.

We conducted a study to identify the factors that are caused by native oxide etching by quantitative analysis of molecules formed by the chemical reactions of NH₃ and NF₃.