

Abstract Submitted
for the GEC11 Meeting of
The American Physical Society

Study on modification process of photoresist by fluorocarbon ions and radicals TAKUYA TAKEUCHI, Nagoya University, SHINPEI AMASAKI, KEIGO TAKEDA, KENJI ISHIKAWA, HIROKI KONDO, MAKOTO SEKINE, MASARU HORI — Etching processes for fabricating high-aspect ratio patterns with nano-scale accuracy are desired in such as a contract hole etching for the silicon dioxide that is used as a dielectric passivation layer over MOSFETs. Photoresists (PR) are indispensable for pattern formation by lithography and for masking of pattern-transfer etching processes. However, the ArF PR have poor tolerability against the process plasma and they may often be deformed to cause line edge roughness, striation, and twisting for the etched features. To overcome these problems and realize sophisticated etching process, we had investigated the reaction of ArF PR with mass-separated fluorocarbon ions, i.e. CF_x^+ ($x=1\sim 3$). In this research, we employed a plasma beam system to ArF PR to expose active species, i.e. ions and radicals, produced in the inductively coupled plasma of fluorocarbon gases. The ion species are accelerated to specific bombardment energy. The plasma beam chamber is connected to analysis chamber of x-ray photoelectron spectroscopy, and the modified surface layer of ArF PR by the plasma beam produced was analyzed with in-situ analysis. From the XPS results, we found the modified layer after CF_4 plasma beam exposure was fluorinated more than that of C_4F_8 .

Takuya Takeuchi
Nagoya University

Date submitted: 15 Jul 2011

Electronic form version 1.4