

Part I: Materials Characterization - SemiconductorJune 24th, 2021

Keeping You Connected • Keeping You Informed

Spectroscopic Ellipsometry for Atomic Layer Etching

Gaëlle Antoun
Orléans University-CNRS, France
gaelle.antoun@univ-orleans.fr

Abstract

Since 2015, Atomic Layer Etching (ALE) has a real gain of interest in the semiconductor industry. This process enables to etch a material few monolayers by few monolayers using very controlled alternated steps. The first step consists in modifying the surface to obtain a modified layer that can be etched at a lower energy than the original layer. The second step is to expose the modified layer to an Ar plasma in order to remove it. In a cycle, depending on the material being etched, 0.1 to 1 nm is etched per cycle. A high precision equipment is hence necessary to monitor the thickness. Therefore, spectroscopic ellipsometry (SE) has become an essential equipment to develop and control ALE. In addition to allowing the monitoring of the thickness variation after etching, in-situ SE in kinetic mode enables to have a perfect knowledge of the thickness evolution in real-time during a process. This presentation will show examples of SE for ALE of Si, SiO₂ and Si₃N₄.

The authors would like to thank TEL for funding and helpful discussions.

This work was supported by CERTeM 2020 platform, which provides most of the equipment.

G. Antoun , T. Tillocher, P. Lefaucieux, R. Dussart