

Sputter Deposition System

AJA ATC ORION

Overview

Sputtering is a technique used to deposit thin films of a material onto a surface (a.k.a. "substrate"). By first creating a gaseous plasma and then accelerating the ions from this plasma into some source material (a.k.a. "target"), the source material is eroded by the arriving ions via energy transfer and is ejected in the form of neutral particles - either individual atoms, clusters of atoms or molecules. As these neutral particles are ejected they will travel in a straight line unless they come into contact with something - other particles or a nearby surface. If a "substrate" such as a Si wafer is placed in the path of these ejected particles it will be coated by a thin film of the source material.

Technical Details

The ATC ORION series sputtering system consists of a 300 mm stainless steel vacuum chamber equipped with UHV vacuum ports to accommodate sputtering sources and other auxiliary units. The ATC ORION features a confocal sputter source flange oriented at specific angles. The specially designed chimney/ground shield/shutter system allows a high degree of deposition uniformity over substrates over twice the target diameter. Typical deposition profile uniformity with SiO₂ on a 3" diameter Si wafer is better than +/- 2% excluding 5 mm edge for 2" sputter source in RF mode. The confocal geometry results in better uniformity, the ability to co-deposit alloy films and the ability to grow better ultra-thin film multilayers since the substrate is always "in the plasma."

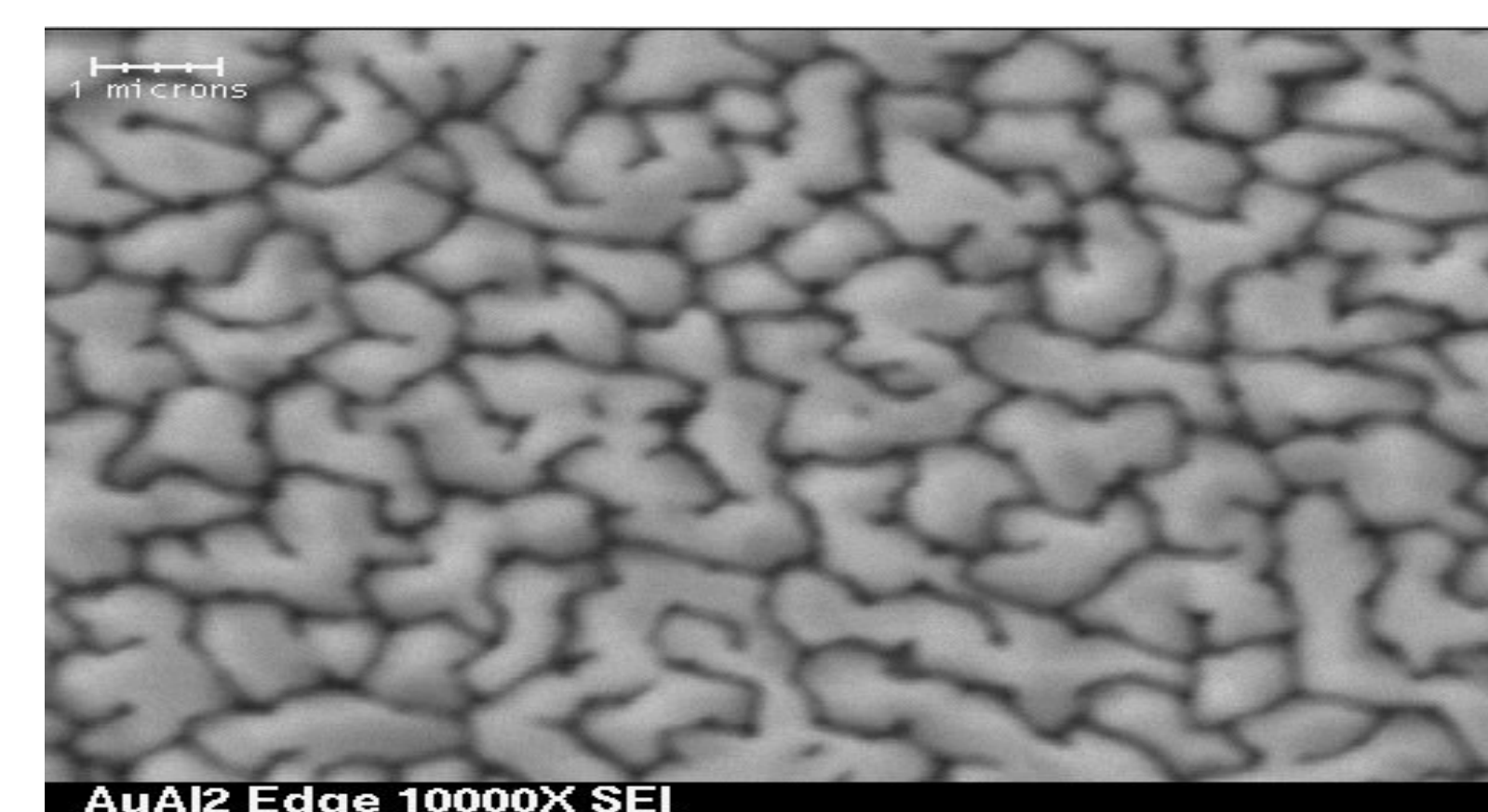
The ORION-5-UHV custom sputtering system is equipped with three 2" and one 1" sputter sources. There are two thermal evaporation sources mounted in the chamber. To control and calibrate sputter deposition rates, a quartz crystal thickness monitor is used. The substrate RF bias can be applied for the pre-cleaning of substrate. A load-lock chamber is used for substrate loading to prevent contamination of the main chamber and to reduce substrate load times. The substrate can be heated up to 850°C.



Detailed Technical Specification

- Sputter up orientation
- Substrate diameter: up to 3"
- Max substrate temperature: 850°C
- Continuous motorized rotation (0-20 rpm) with controller
- Base vacuum: 5.0×10^{-7} Torr
- Magnetron sources: three 2" and one 1"
- Thermal evaporation sources: 2
- Quartz crystal thickness monitor
- Vacuum load lock
- 750 Watt DC generator
- 300 Watt RF generator with auto-matching network
- 50 Watt RF generator for the substrate biasing with manual matching network
- 2 Mass flow controlled gas lines with pneumatic isolation valves and filters

Example Outputs



SEM Image of the sample prepared by the simultaneous sputtering of gold and aluminium.