Prerequisites: none

Class level: Seniors/Graduate students

Modern semiconductor fabrication relies heavily on the use of photoresists to fabricate integrated circuits. Realization of Moore’s law has been in part due to the ability of photoresist manufacturer to provide resists that allow ever decreasing linewidths. The course will cover:

1. Introduction to the basic photochemistry and kinetics of image development. This will involve studies of well-known resists based on diazo chemistry and chemically amplified resist used in DUV.
2. A discussion of fundamental process parameters that are relevant for photoresist use such as surface-preparation, coating, optical/radiation exposure, developing, etching and resist stripping will be presented.
3. Numerical simulations of resist profile using Prolith/3 software. This is meant to provide more quantitative assessment of resist performance useful in process development and research.
4. Hands on lab-training on processing techniques used in photolithography

We will conclude the course with a discussion of emerging soft lithographic techniques and 193nm immersion lithography and EUV resists that allow 45 nm nanometers resolution.

References: (1) *Semiconductor Lithography : Principles, Practices, and Materials (Microdevices : Physics and Fabrication Technologies)* Wayne M. Moreau, General Technology Division, IBM
(2) *Micro-And Nanopatterning Polymers (ACS Symposium Series, No 706)* Hiroshi Ito(Editor)

Comparison of simulated and experimental resist cross-sections through focus for 125°C, 90 seconds post-exposure bake.