Northeastern

DIVISION OF
TECHNOLOGY TRANSFER

TECHNOLOGY AVAILABLE FOR RESEARCH COLLABORATION

Nanotechnology research at Northeastern focuses on the fundamentals of surface cleaning and preparation including particle adhesion and removal. The nanotechnology group works on the development of new substrate independent techniques to remove particulate and ionic contamination. In addition to using water and traditional chemicals, the group also works with cryogenic aerosols and supercritical fluids. The nanotechnology group also study and develop mitigation techniques for contamination in thin film deposition processes (CVD, LPCVD, Sputtering, etc.). In addition, there are tools for physical modeling of particle generation, transport, deposition and removal.

Benefits for University-Industry Collaboration:

Studies estimate that contamination is responsible for 75% of the yield loss in integrated circuit fabrication. The need for clean substrates in the fabrication of microelectronic devices has been well recognized since the dawn of solid-state device technology. The need for clean substrates to manufacture components and devices with small structures is also required in the aerospace, hard disk, display, communications, medical, pharmaceutical and automotive industries. Typically, defects or particles larger than about ¼ of the minimum line-width may cause fatal device defects. Thus innovative cleaning processes are needed to specifically target removal of strongly adherent, nano-scale particles and contaminants for many industries.

Research Area Details:

One example of the research is the cleaning of deep submicron trenches, which presents a tremendous challenge in semiconductor manufacturing. Preliminary results at the Microcontamination Research Laboratory showed both blanket and patterned surfaces, high frequency pulsating flow cleaning is more effective than the typical use of steady flow. Acoustic streaming utilizing megasonic frequencies can effectively clean patterned semiconductor wafers. Research also shows that high frequency acoustic streaming with its thin acoustic boundary layer (in the submicron scale at frequencies higher than 600 kHz) enables the removal of micro and nanoscale particles.

The Bottom Line:

The goal is to develop state of the art techniques for micro and nanoscale contaminant control, removal and characterization in manufacturing and fabrication processes to contribute to the competitiveness of the semiconductor, information technology, pharmaceutical, imaging, aerospace and other industries affected by contamination.

For More Information:

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