CMP Slurry for Polymeric Interlayer Dielectric Planarization

Researchers at the University of South Florida have developed a nanoparticle-based chemical mechanical polishing (CMP) slurry for polymeric dielectric planarization.

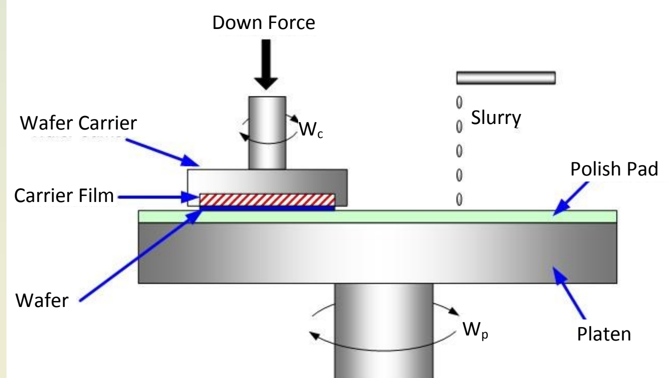
An integrated circuit (IC) is a tiny chip found on nearly every circuit board produced. The IC houses many modern electric components such as resistors, transistors, and capacitors. The semiconductor industry is constantly striving to improve these ICs by reducing delays and size, and by adding functionality and complexity. When manufactured, the CMP process is used to smooth IC surfaces in the circuit board with a combination of both chemical and mechanical forces. This process removes unwanted conductive or dielectric materials to yield a nearly perfect surface that layers of integrated circuitry can then be built on. However, the CMP process is rather abrasive and sometimes damages the circuit board. This highlights the need for a more mild slurry to be developed for CMP purposes.

USF researchers have developed a CMP slurry for polymeric interlayer dielectric planarization which greatly minimizes surface damages. This slurry is comprised of Tetraethylorthosilicate (TEOS)-derived silica and Zirconium-dioxide (ZrO.sub.2) in a chemically active medium. These materials have a relatively small dielectric constant, allotting for enhanced circuit speeds in ICs. When compared to the other materials in the IC (e.g. Silicon, Tungsten, Silica, etc.), these materials are much softer and therefore minimize the likelihood of micro/nano scratching, material delamination, over polish, pattern damage and trough formation. Furthermore, the proposed slurry will also allow the CMP of ICs to decrease in cost.

ADVANTAGES:

- Increased IC circuit speed
- Lowered manufacturing costs
- Reduced material delamination
- Minimized micro/nano scratching
- Reduced trough formation

A Novel CMP Slurry that Reduces Scratching, Over-Polishing, Pattern Damage, and Trough Formation



The Parts and Mechanism of the Chemical Mechanical Polishing (CMP) Process

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