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Prof. Seho Sun, School of Chemical Engineering, Yeungnam University (Gyeongsan, Republic of Korea), leads research on the chemistry and mechanics of CMP slurries for advanced logic and memory fabrication. The group formulates selective slurries for Cu/Co interconnects, barrier/liner materials (Ta/TaN, Ru), W plugs, and oxide/STI levels, balancing removal rate, selectivity, and roughness while suppressing dishing/erosion and galvanic corrosion. Research integrates (i) oxidizer–inhibitor–complexant chemistry to tune passivation kinetics; (ii) abrasive engineering - particle size distribution, morphology, and surface functionalization—to control micro scale contact and defectivity, and (iii) slurry rheology and dispersion stability to ensure uniformity and long term shelf stability. Experimental methods include potentiodynamic and EIS analyses, tribometry and friction monitoring, zeta potential and DLS measurements, and surface/near surface characterization (AFM, XPS, ToF SIMS). Data driven DoE and response surface modeling/ML are used to map process windows and accelerate formulation discovery. A parallel thrust leverages insights from battery passivation and corrosion inhibition to develop eco efficient CMP chemistries with reduced oxidizer content. Collectively, this work delivers CMP solutions that are performance robust, equipment friendly, and scalable for high volume manufacturing.