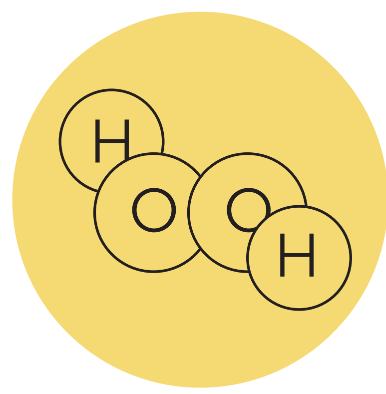
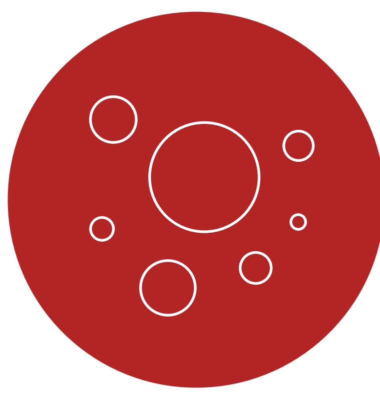
Increasing Yield Through Complete Control of CMP

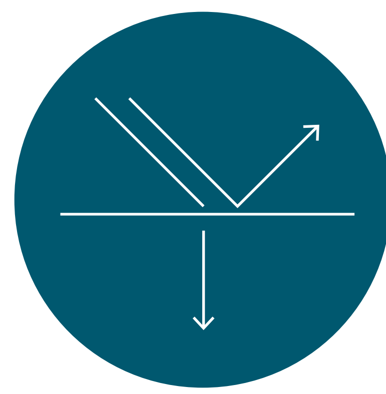
Chemical mechanical planarization (CMP) is used to polish wafer surfaces between layers of material deposition. With chip architectures increasingly making use of complex 3D architectures and novel materials, while also shrinking feature sizes and applying patterning in multiple steps, CMP is performed dozens of times on each wafer. If this process is not tightly controlled, it can quickly lead to yield loss. With three complementary monitoring technologies in hand, Entegris can help you achieve CMP mastery.



Electrochemical Monitoring



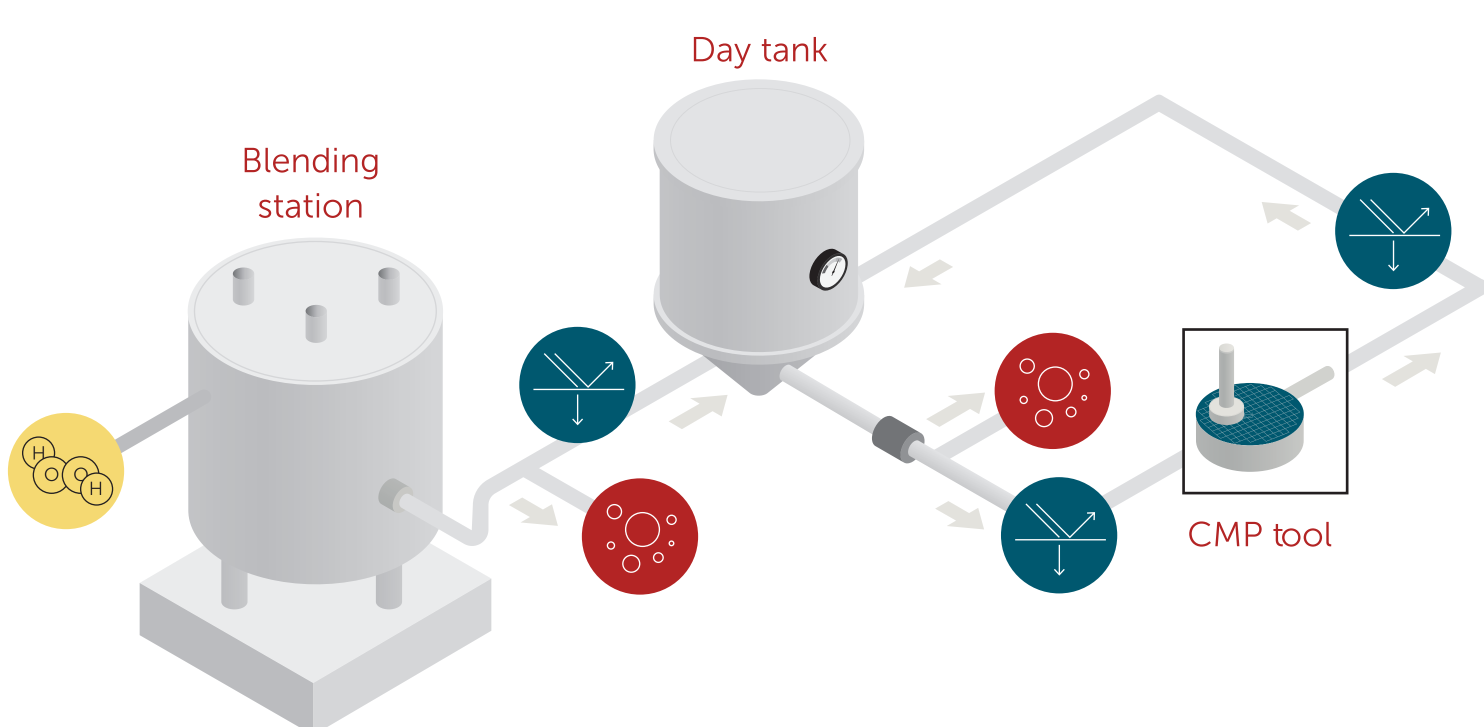
Particle Monitoring



Concentration Monitoring

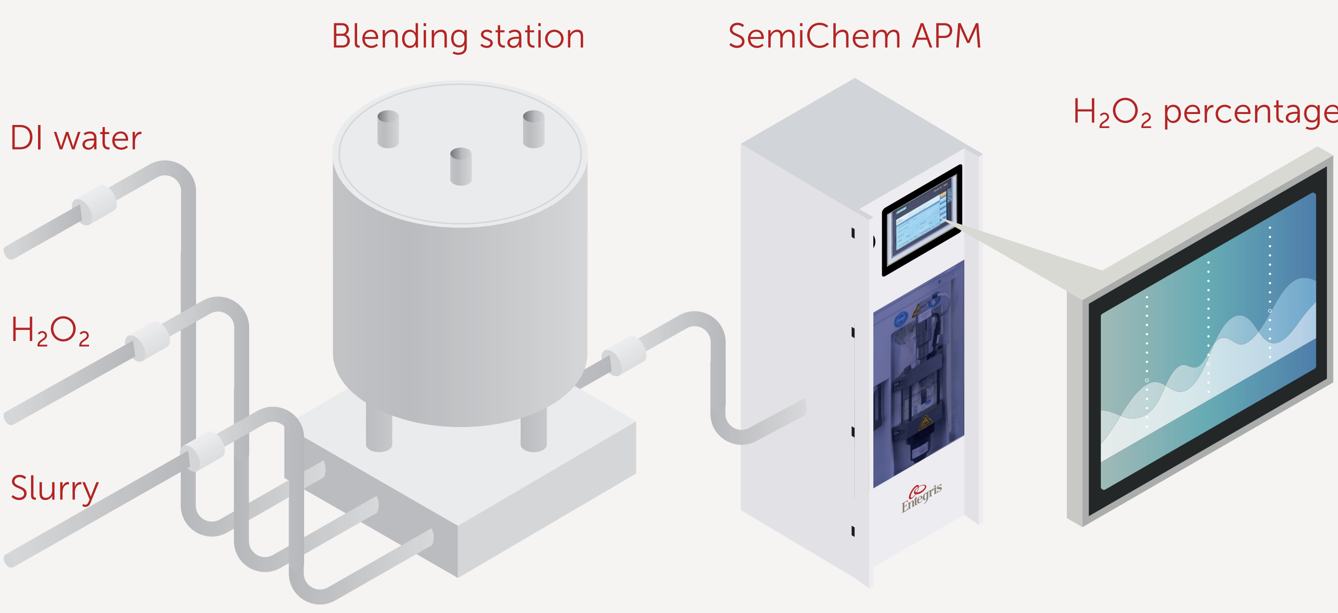
MONITORING THE CMP PROCESS

CMP uses slurries made with silica, alumina, or ceria nanoparticles suspended in an aqueous solution. To prevent defects, variances in the chemical composition and nanoparticle distribution of CMP slurries must be precisely controlled. CMP slurry monitoring is effective in multiple key places within the process.



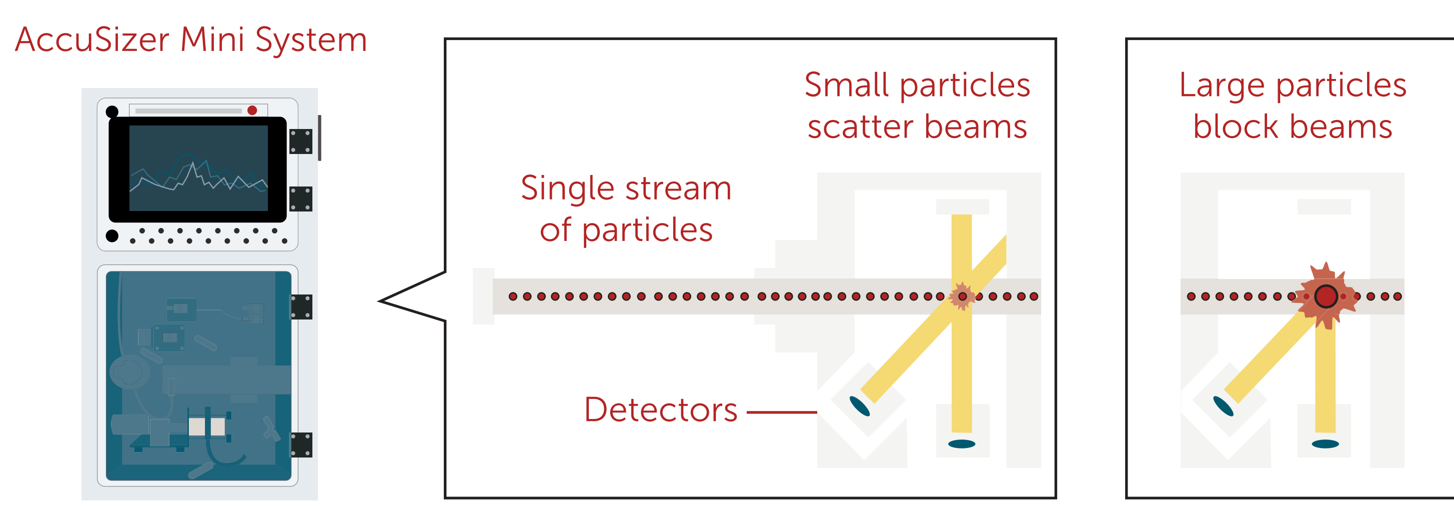
SEMICHEM APM – ELECTROCHEMICAL ANALYSIS DURING CMP BLENDING

The first critical monitoring process occurs where large quantities of CMP slurry are blended. Hydrogen peroxide (H_2O_2) levels, for example, must be maintained within ±0.005% of their target. Our SemiChem APM (advanced process monitor) connects to the blending station and automatically samples and analyzes slurry composition, providing data that helps optimize slurry stability.



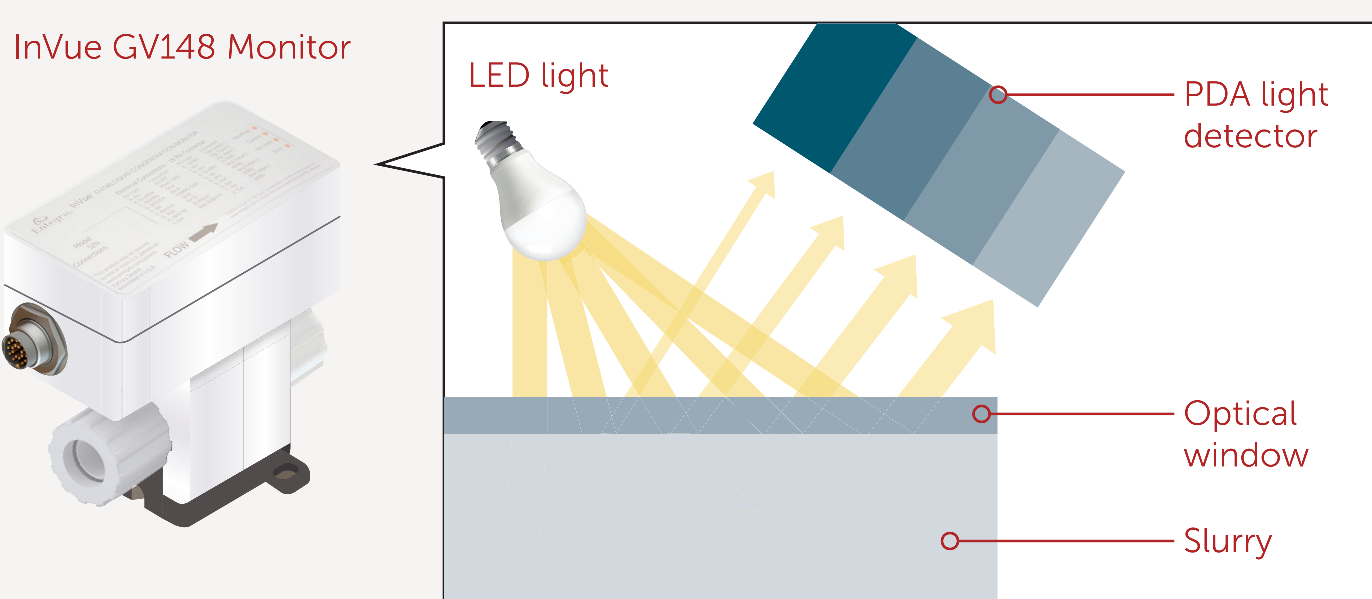
ACCUSIZER® SPOS SYSTEM – CONTROLLING PARTICLE SIZE IN CMP SLURRY

The target diameter of suspended nanoparticles in a CMP slurry is between 20 nm and 200 nm, but larger particles and agglomerates up to 1 micron in size can exist. These large particles leave scratches and defects on the wafer. Our AccuSizer Mini system continuously gathers samples from the slurry pipeline and accurately measures large particle size and counts.



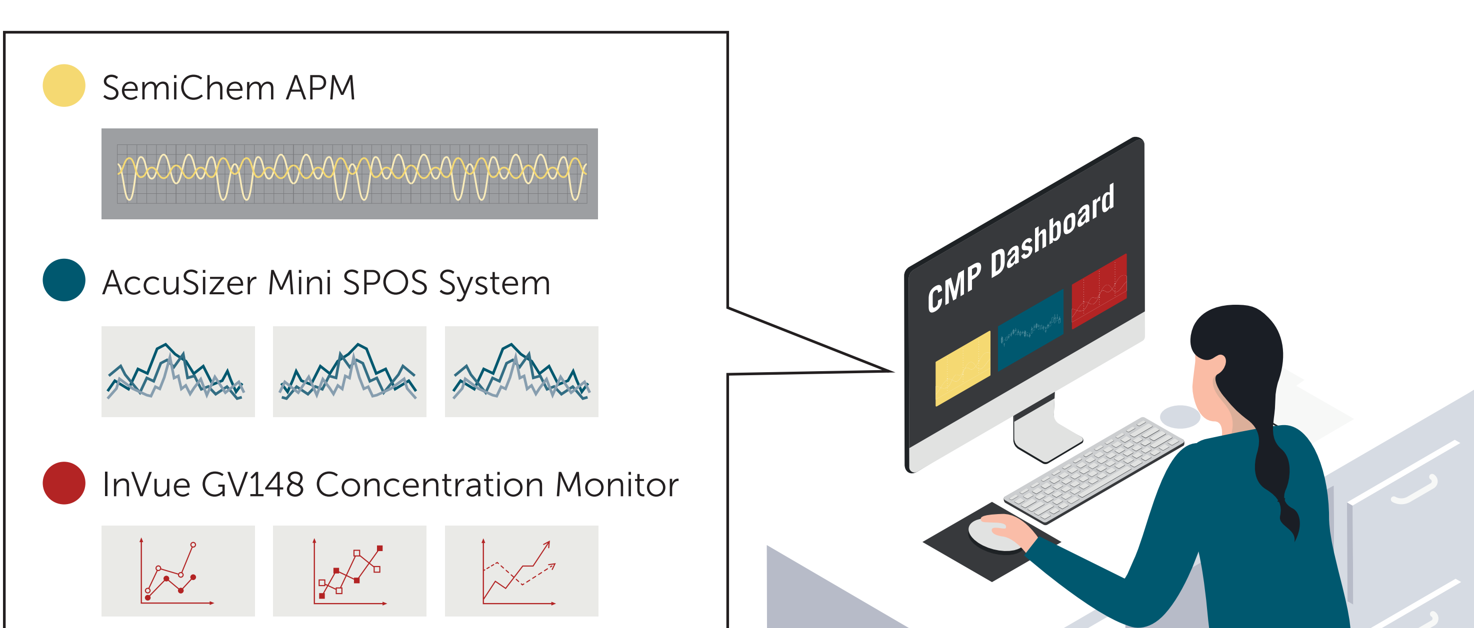
INVUE® GV148 CONCENTRATION MONITOR – MEASURING CHEMICAL COMPOSITION INLINE

The composition of the slurry blend can degrade over a day's use, introducing unwanted variability into the CMP process. Slurry integrity can be monitored at multiple points by measuring its index of refraction using inline instruments.



COMPLETE CMP PROCESS MONITORING

By continuously monitoring CMP slurry health using complementary, automated tools throughout the wafer manufacturing process, fabs can design systems and take proactive measures to greatly reduce yield loss in this critical process step. With expertise and technology from Entegris, fabs can achieve CMP mastery.



Learn More

www.entegris.com/cmp-monitoring

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