Molybdenum Post-CMP Cleaning Formulation with Good Metal Compatibility

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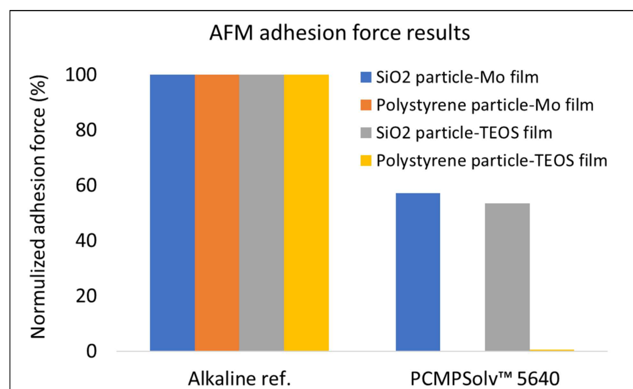
Molybdenum (Mo), with relatively low electric resistance and good thermal stability, has been broadly applied as electrode material in electronic industry. Recently, there has been growing interest to utilize Mo as the metal gate, liner to copper and other uses in advanced node semiconductor industry. For post-chemical mechanical planarization (post-CMP) cleaning of Mo, it is crucial for the cleaner to clean abrasive, organic residue and molybdynum oxide by-products left after Mo CMP process while keep good compatibility with Mo to avoid corrosion. To address the above points, DuPont ACT has developed an alkaline Mo post-CMP cleaner PCMPSolv™ 5640. In our alkaline cleaner, wafer surface was well negatively charged preventing abrasive particle and organic residue re-deposition indicated by AFM adhesion force technique. With corrosion inhibitor, metal corrosion was found low (< 1A/min). Moreover, XPS surface analysis result of Mo showed that our cleaner could reduce oxide on Mo film surface. In all, PCMPSolv™ 5640 not only exhibits good abrasive and organic residue cleaning and metal oxide removal capability but is Mo compatible in alkaline regime that can be applicable in Mo post-CMP cleaning.



The adhesion force between SiO2 (polystyrene) particle and Mo (TEOS) film in PCMP5640 and an alkalic reference solution.

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