

**Impact of CMP
Consumables on
Copper Metallization
Reliability**

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Over the past few years we, as well as others, have systematically characterized the device reliability issues associated with the introduction of copper metallization into IC fabrication.¹ Specifically, we have examined issues associated with interfacial adhesion and material roughness. We have correlated them, in part, to the 'in-process' degradation of polyurethane based CMP pads.

To gain better understanding of these correlations, we have studied in detail, the interactions of simulated copper slurries and pristine segmented polyurethanes². These studies clearly show that polyurethane is fundamentally incompatible with some of the chemicals used in copper CMP, such as hydrogen peroxide. We have incorporated the knowledge from these studies into the design and fabrication of a new class of polyolefins-based application specific pads (ASP).³

In this presentation, we will review experimental copper polishing data on both polyurethane and ASP pads. We

will compare and discuss the fundamental physics and chemistry of the polyurethane and ASP pads, and show how we customize the surfaces of these new pads for specific applications.

¹ Kang, S. et al. Journal of Electronic Materials, Vol. 30 (12), 1506-1512, 2001

² Obeng, Y. et al. Chemical Mechanical Planarization V, ECS Proceedings 2002-1, 13-25; Ramsdell, J. E. et al. Chemical Mechanical Planarization V, ECS Proceedings 2002-1, 26-45

³ Obeng, Y. et al, CAMP CMP Symposium, Lake Placid, NY, August 2002