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Selective Etching Promoted by the Area Selective Growth of Deactivating Polymers. RUDY WOJTECKI, IBM Research — Almaden — As the semiconductor community continues scaling, area selective depositions (ASD) offer the potential to relax down-stream processing steps with self-aligned strategies. Directing a polymerization in an area selective manner offers an ASD process where the deposited film is a porous carbon rich material. This was achieved with the synthesis of polymer initiators that selectively adhere to the metal portion of pre-patterned surface, composed of copper and silicon features. With the use of a ruthenium catalyst (Grubbs generation III) a vapor phase monomer could be introduced to an initiator functionalized surface and polynorbornene grown selectively from the copper features. The resulting polymer films act as an effective inhibitor for the atomic layer deposition of ZnO, where up to 40nm could be selectively deposited on silicon features. While the polymer did not function as an effective inhibitor for TiO_2 ALD, the deposition on the polymer dramatically altered the etching characteristics of the film. This property could be exploited to achieve the area selective etching of metal features despite a non-selective ALD process. This is the first demonstration of an area selective polymerization to enable ASD and selective etch at both micro- and nanoscale features.

Rudy Wojtecki
IBM Research — Almaden

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