206f Chemical Vapor Deposition of Palladium Seed Layers

Gregory L. Griffin and Lidong Wang

We have examined the use of CVD Pd as a seed layer for electroless deposition of Cu on insulating surfaces. The seed layer is deposited onto glass substrates using H_2 reduction of $Pd(hfac)_2$ in a two-step batch reaction process. Experimental variables for controlling the formation of the seed layer include the amount of $Pd(hfac)_2$ admitted to the reactor during the precursor loading step, and the substrate temperature and reaction time during the subsequent deposition step. XPS measurements following seed layer deposition confirm the presence of Pd in both metallic and oxidized states. AFM and SEM images suggest that most of the Pd is present in the form of isolated clusters. The resulting seed layer is active for subsequent Cu electroless deposition using a $CuSO_4$ bath with CH_2O as the reducing agent and EDTA and TMAH as solution stabilizers. This leads to thin copper films that are continuous and highly reflective, with as-deposited resistivities that approach bulk values. Thicker films suffer from delamination, which commences after the films are removed from the plating bath. Attempts to reduce delamination using different electroless deposition conditions (e.g., bath temperature, kinetic additives) suggest that delamination is controlled primarily by film thickness rather than by deposition kinetics.