Abstract Submitted
for the SES05 Meeting of
The American Physical Society

Properties of W-Ge-N as a diffusion barrier material for Cu. SEEMANT RAWAL, DAVID NORTON, Materials Science and Engineering, Univ. of Florida, TIM ANDERSON, Chemical Engineering, Univ. of Florida, LISA MCELWEE-WHITE, Department of Chemistry, Univ. of Florida — The properties of W-Ge-N thin films are reported, focusing on issues relevant to their use as diffusion barriers for Cu metallization on silicon. The amorphous W-Ge-N thin films were deposited on thermally grown SiO2/Si using reactive sputter deposition. This was followed by in-situ deposition of Cu films. Annealing studies for W-Ge-N were then carried out in vacuum to investigate Cu diffusion and barrier film crystallization. X-ray diffraction was used to assess the crystallinity of the films upon annealing. The results show that W-Ge-N has a recrystallization temperature that is higher that that for WNx. Auger electron spectroscopy was used to measure the depth profile of Cu diffusion through the barrier layer. Little or no Cu diffusion was detected for relatively high annealing temperature. The W-Ge-N films were conductive, although the resistivity is somewhat higher than that for WNx. The results suggest that W-Ge-N may be an attractive diffusion barrier material for Si or SiGe devices.

David Norton
Materials Science and Engineering, Univ. of Florida

Date submitted: 09 Aug 2005 Electronic form version 1.4