Palladium Catalyzed Copper Films Deposited from Two Immiscible Supercritical Phases and Subsequent Reaction

김재훈*, Ruben G. Carbonell[1], 김재덕
한국과학기술연구원; [1]North Carolina State University
(jaehoonkim@kist.re.kr*)

Palladium (Pd) catalyzed copper (Cu) films were produced by forming Cu (II) compound (Cu $(hfac)_2 \cdot H_2O$) and Pd (II) compound ($Pd(hfac)_2$) films on native oxide of silicon (SiOx) and titanium nitride (TiN) substrates using a displacement from two immiscible supercritical phases (DISP) technique followed by reducing the organometallic compounds films in hydrogen at 200 oC. The morphology of Cu films was observed using scanning electron microscopy (SEM) and atomic force microscopy (AFM). In the absence of Pd(hfac)2, Cu particles in the range of 60-95 nm formed on SiOx and TiN during 5 min reduction period. As Pd(hfac)2 concentration increased to 5 mole% (relative to the amount of $Cu(hfac)_2 \cdot H_2O$), a morphology transition from particle to film was observed. When $Cu(hfac)_2 \cdot H_2O$ concentration varied from 0.1 wt% to 3 wt% at a fixed $Pd(hfac)_2$ concentration of 5 mole%, highly dense and adherent films with 10-40 nm in thickness were produced. Root mean square (rms) roughness of these films, estimated by AFM images, is in the range of 1.7-5.8 nm.