Enhanced Chemisorption of Cu(hfac)$_2$ on Parylene Surface by N$_2$ Plasma Treatment

S. PIMANPANG, P.-I WANG, D.-X. YE, J. S. JUNEJA, G.-C. WANG, T.-M. LU, Dept. of Physics, Rensselaer Polytechnic Inst., Troy, NY 12180 — The metallization of polymers has been intensively studied due to its wide industrial applications. We report a study of interfacial interaction of metalorganic Cu(hfac)$_2$ with the Parylene surface. Parylene is a low k dielectric polymer prepared by a chemical vapor deposition technique. The as-deposited Parylene surface is shown to be hydrophobic with a measured water droplet contact angle $\sim 72^\circ$. However, after the N$_2$ plasma treatment, the water droplet contact angle decreases to $\sim 40^\circ$ due to the formation of oxygen and nitrogen functional groups on the surface, as observed by x-ray photoelectron spectroscopy (XPS). These functional groups improve Cu(hfac)$_2$ chemisorption on the plasma treated Parylene surface. Further studies by XPS show that chemisorption of Cu(hfac)$_2$ is self-limiting up to 20 sec of Cu(hfac)$_2$ precursor exposure time. The enhancement of chemisorption of metalorganic precursors on the polymer surface is an important step for chemical vapor deposition or atomic layer deposition of metal. Supported by Thai govt. fellowship (SP) and SRC (JSJ).