Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Formation of highly ordered self assembled monolayers of alkanethiol molecules on thermally annealed gold films. YOUNG-KYU HONG, HYUNUNG YU, TAE GEOL LEE, NOAH LEE, JAE HO BAHNG, NAM WOONG SONG, WON CHEGAL, HYUN KYONG SHON, JA-YONG KOO, Korea Research Institute of Standards and Science — We controlled the ordering between alkanethiol molecules in self-assembled monolayers (SAMs) formed on a Au surface by modifying surface topography of Au films. The ordering between molecules was evaluated using Fourier Transform infrared (FTIR) spectroscopy. A thermal annealing in hydrogen environment removed the nm-scale protrusions from the surface of as deposited Au film resulting in an increase in grain size and a decrease in roughness. This process allowed the alignment of Au atoms in the (111) direction. Together with the aligned Au surface, Au nanoparticles were also prepared as a rough surface with tiny grain size of $\sim$ 10 nm. The symmetric and asymmetric CH_2 vibrations in the FTIR spectra showed a larger blueshift from the SAMs on an flatter Au surface. Binding specificity of molecules was examined by Secondary Ion Mass Spectroscopy (SIMS) using a Au pattern formed on a SiO_2/Si wafer. The molecular signal matched with the Au pattern and the ratio of the signals on Au to SiO_2 was larger than 1000, indicating that the level of non-specific binding was negligible. This method of improving and controlling the ordering between molecules in the SAMs can be applied to sub μm patterns on a SiO_2/Si wafer.

Young-Kyu Hong
Korea Research Institute of Standards and Science

Date submitted: 27 Nov 2007 Electronic form version 1.4