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# Current Measurement of Organic Resists Using an Atomic Force Microscope Lithography and Scanning Tunneling Spectroscopy

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The local oxidation on Si substrates has been studied by atomic force microscope lithography. Height changes of silicon oxide layer by AFM anodization lithography are caused by a faradaic current. The oxide growth is accompanied by the transport of OH- ions through the oxide as a result of the electrochemical reactions. The condition of this experiment is only converted by various applied voltages. Heights of anodized pattern were changed during a line lithography of spin-cast organic resists of 2-amino-6-methoxy benzothiazole-azo (MBT-A) and 2-amino-6-methoxybenzothiazol -azo-Ni $[MBT-A]_2Ni^{2+}$ on Si substrates. According to a growth of the oxide layer, we confirmed that changes of a current-value depend on applied voltages. A current-value of a tip-sample was investigated by a scanning tunneling spectroscopy during contact mode lithography. The energy band gaps of $[MBT-A]_2Ni^{2+}$ and MBT-A are 1.71 eV and 1.97 eV based on UV-vis spectra. Current value of a $[MBT-A]_2Ni^{2+}$ is greater than that of MBT-A in the applied bias voltage, and both the threshold lithographic voltage and the maximum speed of lithography are different depending on the property of organic resists.

1. R. K. Workman, C. A. Peterson, D. Sarid, Surface Science, L277~L279, (1999)