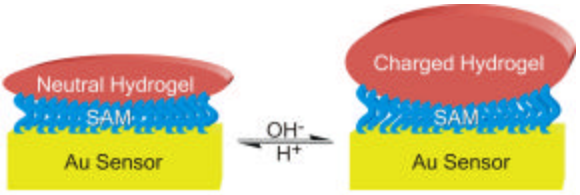
NANOHOUR

Wednesday, December 6, 2006
3:00 PM
Beckman Institute - Room 3269

Responsive Hydrogels as Optical Sensors

Jay Wackerly – Chemistry Department

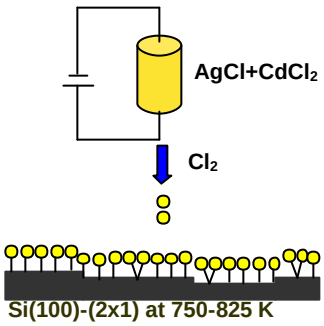


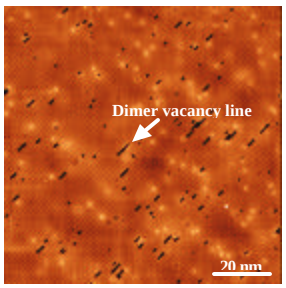
It is known that changes in the dielectric of plasmon based sensors causes a change in the plasmon resonance. Since a change in the dielectric can be caused by the swelling and deswelling of a hydrogel, a plasmonic crystal device consisting of nanostructured metallic gold thin films with surface bound hydrogel has been fabricated. A general scheme has been demonstrated where introduction of an aqueous analyte solution causes a change in the charged state a specific receptor group on the hydrogel. The change of hydrogel from neutral to charged results in a swelling of the hydrogel network and can be detected optically in the visible and near-infrared regions due to shifts in the plasmonic resonances. Specifically, we have demonstrated this using an acrylic acid containing hydrogel with protons as the analytes. This sensor has been shown to be very sensitive to small changes in analyte concentration. Also, very little of the acrylic acid is required for detection, and since changes in the dielectric are only sensitive close to the metal surface, only a thin film of hydrogel is required. This sensor shows promise for analogous systems when the receptor, the analyte, or both are very expensive.

AND

Cl insertion on Si(100)-(2x1): Etching under conditions of Super-Saturation

Abhishek Agrawal – Materials Science and Engineering Department





Super-Saturation Etching of Si(100)

We use scanning tunneling microscopy to show that Cl_2 dosing of Cl-saturated Si(100)-(2x1) surfaces at elevated temperature leads to uptake beyond "saturation" and allows access to a new etching pathway. This process involves Cl insertion in Si-Si dimer bonds or back-bonds, diffusion of the inserted Cl, and ultimately desorption of $SiCl_2$. Investigations into the etch kinetics reveal that insertion occurs via a novel form of Cl_2 dissociative chemisorption that is mediated by Si dangling bond sites. Upon dissociation, one Cl atom adsorbs at the dangling bond while the other can insert.

Coffee and cookies will be served.
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