USING THE EXTRAORDINARY INFRARED TRANSMISSION OF METALLIC SUBWAVELENGTH ARRAYS TO STUDY THE CATALYZED REACTION OF METHANOL TO FORMALDEHYDE ON COPPER OXIDE

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Ordered arrays of subwavelength holes in metal films can exhibit extraordinary transmission resonances throughout the infrared. These resonances are attributed to the excitation of surface plasmons on the metal surface. These resonances can be utilized to excite molecular vibrations of surface adsorbed molecular species. Commercial nickel mesh electrochemically coated with coppper has allowed for the study of copper catalyzed surface reactions. One reaction studied is the copper-oxide catalyzed reaction of methanol to form formaldehyde. Adsorbed intermediates and products have been observed using a simple spectroscopic procedure carried out in air and at room temperature.