MORE THAN A HUNDRED-FOLD ENHANCEMENT IN THE INFRARED ABSORPTION OF MONOLAYERS BY USING METALLIC MICROARRAYS WITH SUBWAVELENGTH APERTURES

KENNETH R. RODRIGUEZ, SHAUN M. WILLIAMS, AMANDA STAFFORD, SARAH BISHOP, USHANI LINCOLN, and JAMES V. COE, *Department of Chemistry, The Ohio State University, Columbus, OH 43210*.

Metallic meshes with arrays of subwavelength apertures show fascinating optical properties including Ebbesen's extraordinary transmission effect[a]. More light is transmitted by these meshes than is incident upon the holes. We have coated these metallic mircoarrays with a self-assembled monolayer (SAM) of 1- dodecanethiol and recorded FTIR absorption spectra with absolute absorbances of approximately 0.2 (approximately $1/3$ of light absorbed on resonance at the CH_2 asymmetric stretch). Literature work using reflection absorption infrared spectroscopy (RAIRS) reports absorbances that vary between 0.002-0.0002 absorbance units. These developments may allow submonolayer coverages of surface species to be studied in direct infrared absorption.

[a] T. W. EBBESEN, H. J. LEZEC, H. F. THIO, and P. A. WOLFF *Nature* **391** (London),(1998).