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A NEXAFS Characterization of Vapor Deposited Monolayer and Submonolayer films on Si, $SiO_2$and Al_2O_3 CHERNO JAYE, DANIEL A. FISCHER, National Institute of Standards and Technology, BENJAMIN M. DEKOVEN, Western Digital, JEFFREY D. CHINN, Integrated Surface Technologies — A large number of microelectromechanical systems (MEMS) are fabricated using semiconductor and ceramic materials such as Si, SiO_2, and Al_2O_3 which are hard, brittle materials. MEMS components are very small and lack power when in motion; and are highly susceptible to the influence of adhesive and surface forces. To mitigate this challenge MEMS lubrication schemes involving vapor phase lubrication have been proposed as a means of continuously replenishing lubricant films on MEMS surfaces. We present synchrotron based near edge x-ray absorption fine structure (NEXAFS) spectroscopy results of vapor deposited monolayers and submonolayers on Si, SiO_2 and Al_2O_3 substrates under different process condition. Carbon K-NEXAFS revealed that the vapor deposited fluorodecyltrichlorosilane (FDTS) molecules on silica and alumina substrates produced self-assembled monolayered films that not only have high surface coverage but are highly oriented. Orientation and coverage comparisons for other pre-cleaning methods as well as directly vapor deposited FDTS will be presented.

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