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Directly Grafting Alkanethiol on Bare Si (111) by UV-assisted Photochemical Reaction LO-YUEH CHANG, HUNG-WEI SHIU, SHANGJR GWO, Natl Tsing Hua Univ, CHIA-HAO CHEN, National Synchrotron Radiation Research Center — Self-assembled monolayers (SAMs) are organic molecules that self-assembled and closely packed on substrate surface. The surface physic and chemical properties are dependent on the controllable tail of SAMs. Therefore, SAMs is attracting a lot of attention in bio-sensing, nano-manipulating, and microfluidic field. The alkanethiol on noble metal surface, such as gold and silver, is a well-known SAM system to understand the fundamental properties. However, alkanethiols grown on semiconductor surfaces was less systematically studied, especially on bare silicon surface, despite their prospective applications. To have in-depth understanding of such system, we tried to grow alkanethiol SAMs on hydrogen-terminated Si surface by UV-assisted photochemical reaction. The resulting monolayer was studied by means of water contact angle measurement, synchrotron radiation based X-ray photoemission spectroscopy, and polarization dependent near-edge X-ray absorption fine structure. The combined characterization probes revealed a hydrophobic ambient surface, and the n-alkanethiols were directly attached on Si through Si-S bond that formed a highly order monolayer to prevent the air oxidation and contamination.

Lo-Yueh Chang
Natl Tsing Hua Univ

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