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X-ray Induced Reorganization/Polymerization of Resorcinol on the TiO_2 Rutile (110) Surface VINOD KUMAR PALIWAL[1], SHAO-CHUN LI, ULRIKE DIEBOLD[2], Department of Physics and Engineering Physics, Tulane University, New Orleans, LA 70118, USA. — The room-temperature adsorption of resorcinol (1, 3 benzenediol, $C_6H_4(OH)_2$) on the (110) surface of rutile TiO_2 was investigated with STM and x-ray photoemission (XPS). The saturation coverage of resorcinol is smaller as compared to catechol (1,2 benzenediol) with a C1s/Ti2$p_{3/2}$ ratio of $\sim$ 7.3% and 12%, respectively. This indicates that resorcinol occupies on average more than two Ti sites on the surface. STM suggests that resorcinol molecules are mobile at lower coverage, whereas a weakly-ordered overlayer with a periodicity of 3 unit-cells along [001] is observed at higher coverages. Interestingly, exposure of resorcinol-saturated TiO_2 surface to an XPS Mg-Kα beam (1253.6 eV) induces a reorganization of adsorbed resorcinol molecules. STM shows well-resolved double chains that run across [001]-oriented rows of TiO_2(110) surface. These results suggest that irradiation induces a polymerization reaction of adsorbed resorcinol molecules, where neighboring aromatic rings are arranged in a zig-zag configuration.

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