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Evolution of Sub-Monolayer Films of Thiolphenol Molecules on Cu(111) Studied by STM KIN WONG, University of California Riverside, KI-YOUNG KWON, ROBERT A. PERRY, BOMMISETTY V. RAO, ERICK ULIN-AVILA, GREG PAWIN, ANWEI LIU, LUDWIG BARTELS — We performed an STM study of the diffusion and aggregation of thiophenol (TP) molecules on Cu(111) at sub-monolayer coverages. Two types of movements were observed in the temperature interval 50K-80K. One is the in-plane rotation of the molecule with the sulfur bond fixed at an adsorption site. The other is the lateral place exchange of the whole molecule to a different adsorption site. The barriers for rotations and hops are 100meV and 120meV respectively. At sufficient substrate temperatures, the TP molecules are found to aggregate into clusters of up to 7 molecules. Increasing the coverage further, no stable islands of more than 7 molecules can be found; instead the density of evenly distributed 7-molecule clusters increases. Further increase of the coverage leads to formation of a disordered film. This is in stark contrast to the behavior of halogen substituted X-TP molecules where X is Br, Cl or F. X-TP molecules readily form ordered islands at low coverage, which grow into continuous films with increasing coverage in agreement with Oswald ripening.

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