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Two-photon photoemission spectroscopy of thiophene/Au(111).[1]
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The electronic structure of thiophene adsorbed on Au(111) is investigated by two-photon photoemission (2PPE) spectroscopy and density functional theory (DFT) calculation. The adsorption of thiophene lowers the work function from 5.50 eV for clean Au(111) to 4.62 eV for Au(111) exposed to 4.0 L thiophene, due to the electron donation from the thiophene to the substrate. With thiophene adsorbed on Au(111), the surface state of Au(111) attenuates and a localized σ^* starts to form with increasing thiophene exposure on Au(111). This σ^* state is attributed to the σ^* antibonding orbital of a Au-S bond and is evidence of an orientational phase transition of adsorbed thiophene. Preliminary 2PPE results will also be presented for aromatic molecules bound to the Au surface via sulfur or other functional goups (e.g., isocyanide).

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