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Two-dimensional Supramolecular Structures by Hydrogen and Halogen Interactions

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Supramolecualr ordering has been actively studied due to it's possible applications to the fabrication processes of nano-electronic devices. Van der Waals interaction and hydrogen bonding are frequently studied mechanisms for various molecular structures based on non-uniform charge distributions. Halogen atoms in molecules can have electrostatic interactions with similar strength. Big halogen atoms have strong non-uniform charge distributions. To study molecular orderings formed by hydrogen and halogen interactions, we chose a molecular system containing oxygen, hydrogen, and bromine atoms, a bromo-quinone. A two-dimensional molecular network was studied on Au(111) using a low-temperature scanning tunneling microscope. Bromo-quinone molecules form self-assembled square grids having windmill structures. Their molecular orderings, chiral structures, and defects are explained in terms of hydrogen and halogen interactions.