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Interfacial Electronic and Magnetic Coupling in Organic-metal System Studied by Scanning Tunneling Microscopy YU-HSUN CHU, C.H. HSU, P.J. HSU, W.J. HSIEH, C.I. LU, S.W. CHEN, C.J. BUTLER, Department of Physics, National Taiwan University, 10617 Taipei, Taiwan, CHAO-CHENG KAUN, Research Center for Applied Sciences, Academia Sinica, Taipei 106, Taiwan, MINN-TSONG LIN, Department of Physics, National Taiwan University, 10617 Taipei, Taiwan — Organic materials have drawn much attention in spintronics studies because of their tunable properties by functional groups and potential to achieve molecular magnets. An important factor influencing these properties is the interfacial effect. In organic-metal systems, different interfaces lead to strong modulation of electronic structures and even magnetic behaviors like spin coupling. In our study, Mn-phthalocyanine (MnPc) deposited on Cu(111) surface have been measured by scanning tunneling microscopy (STM) and spectroscopy (STS) at 4.5 K. With different deposition amount, MnPc are adsorbed as isolated molecules or in an ordered assembled structure. From STS curves, assembled MnPc possess a broadened state near the onset of Cu(111) surface state comparing to islolated ones. According to ab initio calculation, distance between the central Mn atom and the substrate in assembled molecules is reduced due to intermolecular interaction and affects the electronic structures. Magnetic behaviors of MnPc on ferromagnetic metal substrate are further investigated by spin-polarized STM (SP-STM). Spin contrast of isolated molecules on Co nanoislands on Cu(111) is found near the Fermi level in STS maps, which is considered to be ferromagnetic coupling between MnPc and Co islands.

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