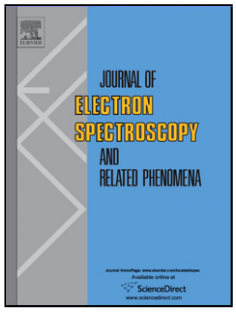

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Charge transfer between transition metal phthalocyanines and metal substrates: The role of the transition metal

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Abstract

We review the interaction mechanism of transition metal phthalocyanines (TMPcs, TM = Mn, Fe, Co) on different metal substrates (Au, Ag, Ni). The interface to Ni is further modified by the introduction of a graphene intermediate layer. Although TMPcs are representatives for flat, π-conjugated carbon systems, their electronic properties are determined to a large extent by the central metal atom. We focus on the role of the central metal atom in interfacial charge transfer processes. On single crystalline metal substrates the molecules grow highly ordered with flat lying adsorption geometry. We focus on studies using photoexcited electron spectroscopies: Photoemission and X-ray absorption spectroscopy (XAS or NEXAFS). The highly ordered growth of TMPcs supports the assignment of polarization dependent XAS features. Depending on both the substrate and the TMPc, the strength of the interaction reaches from weak physisorption to strong chemical interactions. The introduction of graphene buffer layers seems to be a promising route for the tuning of interface properties.

Keywords

organic semiconductors, phthalocyanines, interfaces, charge transfer, photoemission, X-ray absorption spectroscopy

Highlights

- Charge transfer involving the central metal atom of the TMPc occurs at many interfaces.
- Strong interactions on Ag(111) and Ni(111) are accompanied by the formation of interface states.
- Interface properties can be tuned by graphene as an intermediate layer.

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