

Materials

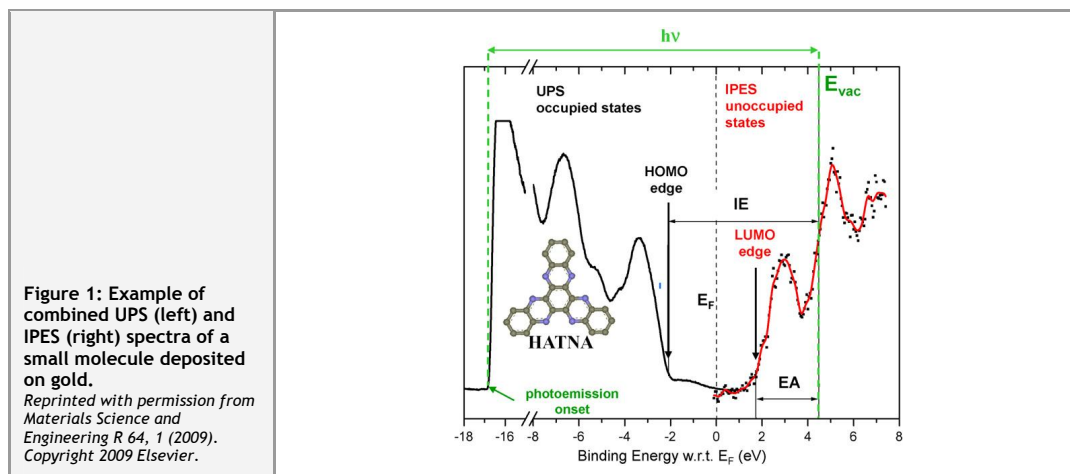
Princeton Univ.: A review on metal-organic interfaces

G. Horowitz

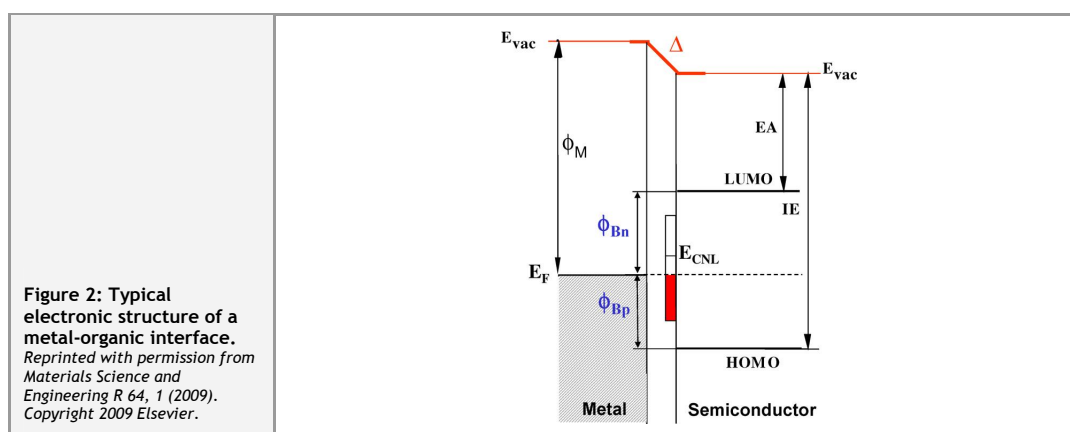
Metal-organic interfaces:
recent advances



Metal-organic interfaces play a dominant role in all kinds of organic electronic devices, including diodes and transistors. Considerable research work has been devoted in the past decade to the understanding of the operation of these interfaces, as they control charge injection and transport through the devices. In this recently published paper, the group of **Antoine Kahn** at **Princeton University** reviews recent advances in this field. The various aspects that are dealt with in depth include the current understanding of the physics of the interface, the experimental methods to determine the key parameters, and a discussion of the energetics of the interface. Experimental techniques mainly comprise ultraviolet photoelectron spectroscopy (UPS), which gives access to the occupied states, and inverse photoelectron spectroscopy (IPES) that provides information on the energy distribution of unoccupied states. These two basic techniques are completed by current-voltage measurements on simple structures. The discussion makes a distinction between interfaces involving polymers and small molecules; it also shows that the interface behave differently depending on whether the organic layer is deposited onto the conducting electrode or the reverse. UPS and IPS data are interpreted in terms of energy level alignment at the electrode-semiconductor interface (Figure 1).



The central point of the paper is to establish whether the energy alignment follows the simple Mott-Schottky rule, which states that the vacuum level is identical at both sides of the interface, or if there exists an interface layer within which a interface dipole develops, thus introducing an additional element in the formation of the hole and electron barriers at the interface (**Erreur ! Source du renvoi introuvable.**).



Since this is a review paper, the information it contains has already been published and is not really new. However, the outstanding interest of the paper resides in the fact that it gathers in one place many pieces of information that are scattered in several papers. Above all, it gives a synthetic and quite comprehensive presentation of the state-of-the-art in this crucial aspect of organic electronics.

A precise knowledge of the energetics of the metal-organic interfaces is of utmost importance in the designing of organic diodes and transistors. UPS and IPS data are very useful within this context. However, the interpretation of the data is far from straightforward, and it is the immense merit of this paper to pinpoint the various artefacts that may lead to an erroneous or incorrect analysis. Furthermore, by discussing a great variety of experimental cases, involving both polymer and small molecule materials, most of the models currently used to rationalise the energetics of metal-organic interfaces are reviewed.

“Energetics of metal-organic interfaces: New experiments and assessment of the field” ; J. Hwang, A. Wan, A. Kahn : *Materials Science and Engineering R* 64, 1 (2009).