

Structure and Electronic Structure of Organic Interfaces: From Well-defined Ideal Interfaces to Real Devices

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【Outline of survey】

Recently there have been much R&D activities on various organic electronic devices such as organic light-emitting diodes (OLEDs), organic photovoltaic cells (OVCs), and organic thin film transistors (OTFTs). Most of these devices have structure in which organic (multi) layer contacts metal electrodes or another organic layer. Thus the clarification and control of factors such as (1) the arrangement of organic molecules at the interface, (2) the energy level alignment at the interface, and (3) significant effect of atmosphere such as air, water vapor, and oxygen. The study of such factors also opens an interesting and important interdisciplinary academic field. We have been leading this field by the first systematic studies, but there remains many problems even for well-defined interfaces formed using atomically flat metal surfaces under clean ultrahigh vacuum environment. In this study, we perform extensive studies combining various experimental techniques on these subjects for clarifying and controlling the organic interfaces.

【Expected results】

In this study, we can expect that there will be significant progress in clarifying factors such as: (1) interaction between organic molecule right in contact with substrate such as metal electrode, (2) understanding of the effect of moisture and oxygen in air on organic interfaces, (3) the validity of doping, which is a common technique in conventional inorganic semiconductors, (4) local information on nonuniform organic film, and (5) observation and understanding of various phenomena at organic interfaces. Such results will help the establishment of a new interdisciplinary field of organic interface studies. Such studies also set the basis for the new field of organic electronics, which is one of the good candidates of the next generation industry of Japan.

【References by the principal investigator】

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【Term of project】 FY2007—2011

【Budget allocation】 19,500,000 yen

(2007 direct cost)

【Homepage address】

http://mat.chem.nagoya-u.ac.jp/info/index_e.html