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Voltage dependence of the electric double layer structure at an ionic liquid/Au interface YUSUKE WAKABAYASHI, RYOSUKE YAMAMOTO, HAZUKI MORISAKI, Grad. Sc. of Eng. Sci., Osaka University, OSAMI SAKATA, National Institute for Materials Science, HIDEKAZU SHIMOTANI, Dept. of Phys., Tohoku University, HONGTAO YUAN, YOSHIHIRO IWASA, Dept. of Appl. Phys., Tokyo University, TSUYOSHI KIMURA, Grad. Sc. of Eng. Sci., Osaka University — Ionic liquids (ILs) have been studied extensively because of their unique characteristics. One of the utilization of them is applying a strong electric field to solids through the electric double layer. Using this field, one can reduce the gate voltage for an organic field effect transistors (FETs) to operate [1]. In order to clarify the microscopic structure of such IL-gated organic FETs, we have performed synchrotron x-ray scattering experiments at BL-13XU of the SPring-8, Japan. While the electric double layer structures at IL-solid interfaces have been studied by x-ray reflectometry [2], the electric double layer is stabilized by the natural polarity of the surface of the solid. In order to observe the electric field effect, we measured an electric double layer formed at the interface between an IL and a Au(111) single crystal under external electric field. The reflectivity profile was found to depend on the applied electric field, which reflects the formation of the electric double layer.

[1] T. Uemura *et al.*, Appl. Phys. Lett., **95**, 103301 (2009).

[2] M. Mezger *et al.*, Science **322**, 424 (2008).

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