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Two extreme limits of carrier injection in organic semiconductor FETs[1] THANGAVEL KANAGASEKARAN, HIDEKAZU SHIMOTANI, YOICHI TANABE, SATOSHI HEGURI, KATSUMI TANIGAKI, Tohoku University — The metal-semiconductor (MS) contact between a metal electrode and an organic semiconductor is generally in the Schottky limit, and the barrier height against carrier injection from the electrode is greatly dependent on the work function (?m) of the electrode. Consequently, air-unstable metals with low ?m's such as Ca are necessary for electron injection. Here, we report that the Schottky limit can be converted to the Bardeen limit and the carrier injection barrier height can become independent of the electrode work function. This is exemplified using tetratetracontane as a surface modification layer on an SiO2 dielectric gate insulator and the unambiguous evidences are given. Based on this finding we demonstrate an air-stable light-emitting organic field-effect transistor using Au electrodes for both hole and electron injection. A light emmitting FET stable in air is demonstrated using Au-Au electrodes.

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Kasumi Tanigaki
Tohoku Univ

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