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Ambipolar Electric Double Layer Transistors Using Organic Single Crystals TAISHI TAKENOBU, Waseda University, PRESTO, DI WEN, Waseda University, HIDEKAZU SHIMOTANI, The University of Tokyo, SHIMPEI ONO, CRIEPI, YOSHIHIRO IWASA, The University of Tokyo, CREST — Among organic devices, ambipolar transistors are very unique device, in which both electrons and holes are equally mobile and we are able to observe light emission through the recombination of them. Progress in the applications of such light-emitting transistors (LETs) based on organic single crystals has provided possibilities in developing organic laser. However, in these LETs, the current density is still low for lasing, and, therefore, a different device structure is necessary to overcome this issue. Here we show the first demonstration of organic ambipolar electric double layer transistors (EDLTs), in which the gate dielectric is not a conventional insulator but an electrolyte. The peculiar merit of EDLT is extremely high conductivity due to the huge capacitance of the EDL formed at the organic/electrolyte interfaces. Consequently, we can increase current density. In this study, we used rubrene single crystal and ion-gel as the active material and electrolyte, respectively. These present results will provide a prospect for further development in LET operation.

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