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Organic electrical double layer transistors gated with ionic liquids[1] WEI XIE, C. DANIEL FRISBIE, Department of Chemical Engineering and Materials Science, University of Minnesota — Transport in organic semiconductors gated with several types of ionic liquids has been systematically studied at charge densities larger than 10^{13} cm^{-2}. We observe a pronounced maximum in channel conductance for both p-type and n-type organic single crystals which is attributed to carrier localization at the semiconductor-electrolyte interface. Carrier mobility, as well as charge density and dielectric capacitance are determined through displacement current measurement and capacitance-voltage measurement. By using a larger-sized and spherical anion, tris(pentafluoroethyl)trifluorophosphate (FAP), effective carrier mobility in rubrene can be enhanced substantially up to 3.2 $cm^2V^{-1}s^{-1}$. Efforts have been made to maximize the charge density in rubrene single crystals, and at low temperature when higher gate bias can be applied, charge density can more than double the amount of that at room temperature, reaching $8*10^{13}$ cm^{-2} holes (0.4 holes per rubrene molecule).

[1]NSF MRSEC program at the University of Minnesota

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