

Electric Field Induced Interface Superconductivity

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Electric double layer (EDL), a nano-gapped capacitor self-organized at the solid-liquid interfaces, is an electrochemical concept proposed by Helmholtz 150 year ago. Because of its large capacitance and high density charge accumulation, EDL has been used in market as capacitor devices, called Supercapacitor or EDLC. We used EDL as a gate dielectric of a transistor device, which is named as EDL transistor (EDLT), and have demonstrated that EDLT can be a powerful tool for controlling interface quantum phases. An amazing example is the realization of electric field induced superconductivity in several insulators without any help of chemical doping, which has been anticipated for the last 50 years without success. In this paper, we describe a basic concept of EDLT and variety of electric field induced phenomena including superconductivity.

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