

Two-dimensional Electronics based on Ion-gated Nanosheets

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An electric double layer transistor (EDLT), a variation of a conventional field effect transistor (FET), is attracting increasing interests because of its ability to accumulate dense carriers ($\sim 10^{14} \text{ cm}^{-2}$) mediated by the movement of organic ions at the channel surface (see Figure). Integrating EDLT with varieties of inorganic nano-sheets (isolated from different layered materials) forms novel two-dimensional electronic systems at organic/inorganic interfaces hosting many controllable electronic phases. In this talk, I will present an experimental study on the field effect control of quantum phase transitions such as metal-insulator transition, superconductivity, and ferromagnetism using EDLT as an effective tool. By applying to a broader range of materials (for instance, varieties of thin films and single crystals), this organic/inorganic interface is promising to act as a rich playground for novel electronic properties and an emerging source of new device functionalities.

