

Gate-Induced Superconductivity in Layered-Material-Based Electric Double Layer Transistors

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Ion-gated devices using an electrochemical concept of electric double layer are attracting increasing interests due to its unique abilities in accumulating high density carriers required even for inducing superconductivity^{1,2}. With the introduction of new gate dielectrics: ionic liquid, the ability of ion gating was further improved by promoting the surface charge density to the order of $\sim 10^{14} \text{ cm}^{-2}$. Comparing with the carrier density required by conventional superconductors, this density is well within the range in which superconductivity could be hopefully induced in a broad range of materials. Using the graphene techniques, atomically flat surface can be fabricated from the layered materials easily providing ideal transistor channels. And a combination of the techniques above can be an important tool to investigate the gate-induced superconductivity.

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