

## 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<sup>1,2</sup>. 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.

<sup>1</sup>K. Ueno, S. Nakamura, H. Shimotani, A. Ohtomo, N. Kimura, T. Nojima, H. Aoki, Y. Iwasa, M. Kawasaki, *Nat. Mater.* **7**, 855 (2008).

<sup>2</sup>J. T. Ye, S. Inoue, K. Kobayashi, Y. Kasahara, H. T. Yuan, H. Shimotani, Y. Iwasa, *Nat. Mater.* **9**, 125 (2010).