Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

**Two dimensionality in electric field induced superconductivity** YU SAITO, School of Engneering, University of Tokyo, Japan, JIANTING YE, Device Physics of Complexed Materials, Zernike Institute for Advanced Materials, University of Groningen, The Netherlands, YIJIN ZHANG, School of Engneering, University of Tokyo, Japan, YUICHI KASAHARA, Quantum-Phase Electronics Center (QPEC), University of Tokyo, Japan, TSUTOM NOJIMA, Institute for Materials Research, Tohoku University, Japan, YOSHIHIRO IWASA, Quantum-Phase Electronics Center (QPEC), Univesity of Tokyo, Japan — Applying electric field is recognized as a useful tool for search of novel superconductors by using the ionic gating. The method allows us to accumulate carrier density exceeding $1 \times 10^{14}$ $cm^{-2}$, which is sufficiently large enough for inducing superconductivity. Although such superconductivity has been demonstrated in several systems, physical properties have not been well investigated. In this presentation we will report on the phase diagram and two-dimensional (2D) nature of electric field induced superconductivity. We fabricated electric double layer transistor on superconductivity on ZrNCl [1] and $MoS_2$ [2] using mechanical exfoliation followed by electron beam lithography. First we have established a relation between $T_c$ and the sheet carrier density on both compounds, and compared with the bulk phase diagram. Second, we measured angle dependence of upper critical field and confirmed the 2D nature of superconductivity in both compounds. We have obtained the thickness of superconductivity as 1-2 nm in both compounds.

[1] J. T. Ye et al., Nat. Mater. 9, 125 (2010).
[2] J. T. Ye et al., Science 338, 1193 (2012).

Yu Saito
School of Engneering, University of Tokyo

Date submitted: 13 Nov 2013 Electronic form version 1.4