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Superconductivity in monolayer FeSe and quantum Griffiths singularity in 2D superconductors¹

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By direct transport and magnetic measurements, we provide first direct evidence for high temperature superconductivity in monolayer FeSe films on insulating SrTiO₃ (STO) substrates with the onset T_c and critical current density much higher than those for bulk FeSe [1]. Besides, the thickness dependent superconductivity in ultrathin FeSe films on STO has been investigated [2,3]. By both in situ scanning tunneling microscopy/spectroscopy and ex situ transport and magnetization measurements, we find that the two-atomic-layer Ga film with graphene-like structure on wide band-gap semiconductor GaN is superconducting with T_c up to 5.4 K [4]. Furthermore, in three-atomic-layer Ga films, we observe for the first time the quantum Griffiths singularity of superconductor-metal transition in two dimensional (2D) superconductors [5]. References: 1. Chin. Phys. Lett. 31, 017401 (2014) (Editors' choice in Science 343, 230 (2014)) 2. Scientific Reports 4, 6040 (2014) 3. arXiv:1507.08431 (accepted by 2D Materials) 4. Physical Review Letters 114, 107003 (2015) (Editors' Suggestion) 5. Science 350, 542 (2015) (accompanied with a perspective paper: Science 350, 509)

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