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Disorder-enhanced superconductivity in epitaxial monolayer $NbSe_2$ KUN ZHAO, Department of Physics, Tsinghua University, Beijing 100084, China — Noncentrosymmetric monolayer $NbSe_2$ film has successfully been synthesized on graphene/SiC(0001) substrate by molecular beam epitaxy. Using the *in situ* ultralow-temperature scanning tunneling microscopy, the superconductivity of epitaxial monolayer $NbSe_2$ film has been confirmed. The superconducting gap is 0.12 meV and the transition temperature is 0.90 K. Impurity scattering has successfully been introduced into monolayer $NbSe_2$ film by depositing Si atoms on its surface at low temperature. Remarkably, an anomalous enhancement of superconductivity induced by disorder has been discovered and a dome-shaped superconducting phase diagram has been observed. At the optimal-doping coverage, the superconducting gap is 0.44 meV and the transition temperature is 2.37 K. Our discovery not only sheds light to better understanding of superconductivity in layered transition metal dichalcogenides but also paves a new avenue of achieving higher T_c in noncentrosymmetric superconductors.

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