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Low-temperature STM/STS study on superconducting FeSe films[1] XUCUN MA, CANLI SONG, YILIN WANG, PENG CHENG, LILI WANG, KE HE, XI CHEN, QIKUN XUE, INSTITUTE OF PHYSICS, CHINESE ACADEMY OF SCIENCES TEAM, DEPARTMENT OF PHYSICS, TSINGHUA UNIVERSITY TEAM — By using molecular beam epitaxy (MBE) technique, we have prepared single crystalline and atomically flat FeSe thin films on graphene-terminated SiC substrate. Low temperature scanning tunneling microscopy/spectroscopy (STM/STS) measurements reveal that the local superconducting gap in the quasiparticle density of states remains robust down to two triple layers (∼1.1 nm), and that the FeSe films show a novel thickness-dependent superconductivity transition behavior. We show that the superconductivity of the FeSe films can be manipulated by concise control of their surface structures. dI/dV mapping of the vortex lattice confirms that FeSe is a typical type II superconductor. Understanding these properties may help us to unravel the mechanism of the recently discovered Fe-based superconductors and even the long-term studied cuprates.

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