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**Tuning the superconductivity in single-layer FeSe/oxides by interface engineering**

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The discovery of high $T_c$ in single-layer FeSe films has enormous implications for both searching new high Tc superconductors and exploring the important factors for high temperature superconductivity. In this talk, I will show our recent angle-resolved photoemission studies on various FeSe-based heterostructures grown by molecular beam epitaxy. We systematically studied the electronic structures and superconducting properties of FeSe with varied strain, different interfacial oxide materials and different thicknesses, and uncover that electronic correlations and superconducting gap-closing temperatures are tuned by interfacial effects. We exclude the direct relation between superconductivity and tensile strain, or the energy of an interfacial phonon mode, and demonstrate the crucial and non-trivial role of FeSe/oxide interface on the high pairing temperature. By tuning the interface, superconducting pairing temperature reaches up to 75K in FeSe/Nb:$BaTiO_3$/$KTaO_3$ with the in-plane lattice of 3.99 Å , which sets a new superconducting-gap-closing temperature record for iron-based superconductors, and may paves the way to more cost-effective applications of ultra-thin superconductors. Besides, in extremely tensile-strained single-layer FeSe films, we found that the Fermi surfaces consist of two elliptical electron pockets at the zone corner, without detectable hybridization. The lifting of degeneracy is clearly observed for the first time for the iron-based superconductors with only electron Fermi surfaces. Intriguingly, the superconducting gap distribution is anisotropic but nodeless around the electron pockets, with minima at the crossings of the two pockets. Our results provide important experimental foundations for understanding the interfacial superconductivity and the pairing symmetry puzzle of iron-based superconductors, and also provide clues for further enhancing $T_c$ through interface engineering.