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Thickness dependence of superconductivity in $FeSe_{0.5}Te_{0.5}$ nanodevices CHUNLEI YUE, JIN HU, XUE LIU, ZHIQIANG MAO, JIANG WEI, Department of Physics and Engineering Physics, Tulane University — We investigated the thickness dependence of superconductivity on thin film single-crystal $FeSe_{0.5}Te_{0.5}$ nanodevices. We designed two independent approaches of exfoliation and ion milling to reduce the crystal thickness. On both methods, we discovered that once the thickness of crystal is reduced below 20nm, the superconductivity disappears. When the thickness is approaching to the critical thickness of 20nm, the normal state becomes more insulating, and transition temperature (14K) shifts toward lower temperature. In addition, ion milling method reveals that there is always about 6nm of non- stoichiometric $FeSe_xTe_{1-x}$ developed on the surface of $FeSe_{0.5}Te_{0.5}$ single crystal in ambient environment.

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