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STM/S study of the interplay between local and average effects of single atomic impurities in Fe(Te,Se) ZHIYANG YE, JIAXIN YIN, Institute of Physics, Chinese Academy of Sciences, ZHENG WU, JIHUI WANG, TcSUH, University of Houston, ANG LI, Shanghai Institute of Microsystem and Information Technology, Chinese Academy of Sciences, XUEJIN LIANG, Institute of Physics, Chinese Academy of Sciences, JIAN LI, CHIN-SEN TING, PEI-HERNG HOR, TcSUH, University of Houston, HONG DING, Institute of Physics, Chinese Academy of Sciences, SHUHENG H PAN, TcSUH, University of Houston;Institute of Physics, Chinese Academy of Sciences — In materials with electron correlations, simple defects can affect both the local and the macroscopic properties of the system. We use low temperature scanning tunneling microscopy/spectroscopy (STM/S) to systematically investigate the local and average effects due to single atomic impurities in Fe(Te,Se). We have found that these single atomic impurities cause strong scattering and destroy superconductivity locally. On the other hand, the average quasi particle density of states at Fermi level exhibits a near square-root dependence on impurity concentration, suggesting that the impurity scattering is in the unitary limit. More interestingly, the superconducting gap magnitude is not affected by the impurities, despite a huge reduction of the super-fluid density and the superconducting transition temperature. We have also observed the local and the average doping effects of these single atomic impurities. Based on these observations, we will highlight the interplay between the local and the average impurity scattering effects in this iron-based superconducting system.

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