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Imaging oxygen vacancies in EuO_{1-x} using Scanning Tunneling Microscopy and Spectroscopy AARON WANG, GAURAB RIMAL, JINKE TANG, TEYU CHIEN, Univ of Wyoming — EuO_{1-x} , a ferromagnetic semiconductor, attracts plenty of attention due to its unique magnetic properties, such as the possible existence of the magnetic polarons and skyrmions. Here we present a scanning tunneling microscopy and spectroscopy study of the EuO_{1-x} thin film made by pulsed laser deposition. After an ultra-high vacuum sputtering followed by a 300 °C annealing, the topography and dI/dV mapping of the EuO_{1-x} were successfully measured. Interestingly, in dI/dV mapping, around 5 nm sizes dot-like features with higher dI/dV contrast were observed. The observed dot-like features were sparsely and uniformly distributed over the measured surfaces. After further annealing at 500 °C for another 30 minutes, the number of the dot-like features in dI/dV mapping increased to overlap each other, indicating the dot-like features are most likely related to the oxygen vacancies created by vacuum annealing. The dI/dV spectra inside and outside of the dot-like features showed similar bandgap but distinct spectral weight in both valence and conduction bands. This work paves the road for further STM study on this intriguing material.

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