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Probing the Spin-Density-Wave Transition in SmOFeAs using Point-Contact Spectroscopy T. Y. CHEN, S.X. HUANG, JHU, R. H. LIU, X. H. CHEN, USTC, C. L. CHIEN, JHU, JOHNS HOPKINS UNIVERSITY COLLABORATION, UNIVERSITY OF SCIENCE AND TECHNOLOGY OF CHINA COLLABORATION — In spring 2008, a new family of superconductors with the general composition of SmFeAs($O_{1-x}F_x$) has been discovered. The metallic parent compound SmOFeAs has a spin-density-wave (SDW) transition near 150 K with hysteretic temperature dependence in magnetic structure, crystalline structure, and resistance. Doping the parent compound with fluorine results in the suppression of the SDW transition and the emergence of superconductivity with transition temperatures up to 55 K. Some theories suggest that the SDW transition may be intimately related to the superconductivity. In this work, we use point-contact spectroscopy to investigate the SDW transition in the parent SmOFeAs compound. Instead of varying temperature, under a high bias voltage a small region underneath a point contact can be heated up through the SDW transition, resulting in differential conductance peaks. Similar to the temperature dependence of the resistance and structure, the SDW transition is hysteretic with bias voltage at the transition. We further show that this feature in differential conductance, which may be easily mistaken as a pseudo gap of a superconductor, is actually a characteristic of the ballistic heating effect.

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