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Nematic quantum criticality in $FeSe_{1-x}S_x$ revealed by elastoresistance measurements SUGURU HOSOI, KOHEI MATSUURA, HAO WANG, KOUSUKE ISHIDA, YUTA MIZUKAMI, Department of Advanced Materials Science, University of Tokyo, Kashiwa, Chiba 277-8561, Japan, TATSUYA WATASHIGE, SHIGERU KASAHARA, YUJI MATSUDA, Department of Physics, Kyoto University, Sakyo-ku, Kyoto 606-8502, Japan, TAKASADA SHIBAUCHI, Department of Advanced Materials Science, University of Tokyo, Kashiwa, Chiba 277-8561, Japan — Electronic nematicity and its connection to the high-temperature superconductivity is one of the central issues in iron-based superconductors. Among them, FeSe is unique in that it exhibits a tetragonal-to-orthorhombic structural transition but no antiferromagnetic order, which enables us to study the nematicity without the effect of magnetism. Here we report on elastoresistance measurements in $FeSe_{1-x}S_x$ evidencing a nonmagnetic nematic quantum critical point near $x \sim 0.2$. When the Se site is substituted by the isovalent S, the structural transition temperature is reduced gradually and it vanishes above $x \sim 0.2$. From the changes in in-plane resistivity induced by anisotropic strain, we evaluate the nematic susceptibility which shows Curie-Weiss-like temperature dependence. We find that with increasing x the Weiss temperature changes its sign indicating a quantum critical point, while there is no sign of antiferromagnetism for all samples. The superconducting transition temperature does not show a significant change with S concentration, suggesting that the nonmagnetic nematic quantum criticality does not help to enhance superconductivity in this system.

Suguru Hosoi
Department of Advanced Materials Science, University of Tokyo, Kashiwa, Chiba 277-8561, Japan

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