

Abstract Submitted
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Determination of the Nature of the Tetragonal to Orthorhombic Phase Transition in SrFe_2As_2 by Measurement of the Local Order Parameter¹ JAMES LOUDON, CHARLOTTE BOWELL, Dept. Materials Science and Metallurgy, University of Cambridge, SUCHITRA SEBASTIAN, JACK GILLETT, Dept. Physics, University of Cambridge, PAUL MIDGLEY, Dept. Materials Science and Metallurgy, University of Cambridge — SrFe_2As_2 is the end-member for a series of the recently discovered iron-pnictide superconductors. There is controversy over whether the tetragonal to orthorhombic phase transition it exhibits is first or second order and we suggest that much of the problem stems from the macroscopic measurements used to make this determination. Instead we use transmission electron microscopy to monitor the order parameter on a local scale and this demonstrates that the transformation is first order and that the orthorhombic phase grows as needle domains. From these observations, we classify the phase transition as martensitic so that the rearrangement of atoms required to form the orthorhombic phase forms is effected via the passage of transformation dislocations which nucleate at the edge of the sample or at defective regions and these then move into the bulk. This helps to resolve some apparent inconsistencies seen in x-ray diffraction investigations into this compound.

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