

Experiment Report Form

The double page inside this form is to be filled in by all users or groups of users who have had access to beam time for measurements at the ESRF.

Once completed, the report should be submitted electronically to the User Office via the User Portal:

<https://www.esrf.fr/misapps/SMISWebClient/protected/welcome.do>

Reports supporting requests for additional beam time

Reports can be submitted independently of new proposals – it is necessary simply to indicate the number of the report(s) supporting a new proposal on the proposal form.

The Review Committees reserve the right to reject new proposals from groups who have not reported on the use of beam time allocated previously.

Reports on experiments relating to long term projects

Proposers awarded beam time for a long term project are required to submit an interim report at the end of each year, irrespective of the number of shifts of beam time they have used.

Published papers

All users must give proper credit to ESRF staff members and proper mention to ESRF facilities which were essential for the results described in any ensuing publication. Further, they are obliged to send to the Joint ESRF/ ILL library the complete reference and the abstract of all papers appearing in print, and resulting from the use of the ESRF.

Should you wish to make more general comments on the experiment, please note them on the User Evaluation Form, and send both the Report and the Evaluation Form to the User Office.

Deadlines for submission of Experimental Reports

- 1st March for experiments carried out up until June of the previous year;
- 1st September for experiments carried out up until January of the same year.

Instructions for preparing your Report

- fill in a separate form for each project or series of measurements.
- type your report, in English.
- include the reference number of the proposal to which the report refers.
- make sure that the text, tables and figures fit into the space available.
- if your work is published or is in press, you may prefer to paste in the abstract, and add full reference details. If the abstract is in a language other than English, please include an English translation.



Experiment title: Nanoscale phase separation in the iron chalcogenide superconductor $K_{0.8}Fe_{1.6}Se_2$ as seen via scanning nanofocused x-ray diffraction

Experiment number:
HS-4366

Beamline:
ID13

Date of experiment:
from: 16/Apr/2011 to: 19/Apr/2011

Date of report:
30/08/2011

Shifts:
8

Local contact(s):
Micheal Reynolds, Manfred Burghammer

Received at ESRF:

Names and affiliations of applicants (* indicates experimentalists):

Nicola Poccia, Sapienza University of Rome

Alessandro Ricci, Sapienza University of Rome

Gaetano Campi, CNR Institute of Crystallography, Montelibretti, Rome.

Report: Advanced synchrotron radiation focusing down to a size of 300 nm has been used to visualize nanoscale phase separation in the $K_{0.8}Fe_{1.6}Se_2$ superconducting system using scanning nanofocus single-crystal x-ray diffraction. The results show an intrinsic phase separation in $K_{0.8}Fe_{1.6}Se_2$ single crystals at $T < 520$ K, revealing the coexistence of (i) a magnetic phase characterized by an expanded lattice with superstructures due to Fe vacancy ordering and (ii) a nonmagnetic phase with an in-plane compressed lattice. The spatial distribution of the two phases at 300 K shows a frustrated or arrested nature of the phase separation. The space-resolved imaging of the phase separation permitted us to provide direct evidence of nanophase domains smaller than 300 nm and different micrometer-sized regions with percolating magnetic or nonmagnetic domains forming a multiscale complex network of the two phases [1].

A. Ricci, N. Poccia, G. Campi, B. Joseph, G. Arrighetti, L. Barba, M. Reynolds, M. Burghammer, H. Takeya, Y. Mizuguchi, et al., *Physical Review B* **84**, 060511+ (2011)