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| <b>Experiment title:</b><br><b>K-Edge XAFS Studies of Rare-Earth doped Hexaferrite Magnets.</b> | <b>Experiment number:</b><br>HS1664  |
| <b>Beamline:</b><br>BM8   | <b>Date of experiment:</b><br>from: 11-FEB-02 to: 13-FEB-02<br>04-APR-02 06-APR-02 |
| <b>Shifts:</b><br>18  | <b>Local contact(s):</b><br>Dr. Francesco D'ACAPITO                                |

*Received at ESRF:*

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## **Report:**

The aim of this experiment was to study the location of F-block dopants into the  $\text{SrFe}_{12}\text{O}_{12}$  lattice, when doped in one of two manners. The two methods of doping were  $\text{Sr}_{1-x}\text{Ln}_x\text{Fe}_{12}\text{O}_{19}$  ( $\text{Ln} = \text{La}, \text{Nd}, \text{Eu}, \text{and Er}$ ) and  $\text{SrFe}_{12-x}\text{Ln}_x\text{O}_{19}$  ( $\text{Ln} = \text{La}, \text{Nd}, \text{Eu}, \text{and Er}$ ), in both cases  $x=0.1$ .

Previous measurements on these systems have tended to study the location of D-block dopants in the systems, e.g. Ti, Zn, Mn etc. When F-block dopants have been studied they have been restricted to using L3-edges primarily for the availability of energies at 2<sup>nd</sup> generation synchrotrons. These types of measurements have inherent problems when used in conjunction with Fe, generally the K-edge of Fe interferes with the collection of data. This experiment aimed to utilise the higher energies available at the ESRF to nullify this problem. Therefore this experiment was aiming to be one of the first to study the location of F-block dopants in the lattice of an important magnetic system using K-edge energies.

Since the experiment aimed to study elements which had a wide range of X-ray energies, the data was collected in two stages. The first stage was to collect data on samples containing La (38.934 keV), Nd (43.574 keV), Eu (49.519 keV). The samples were measured using the Fluorescence detector on BM8. The second part of the experiment was to collect the data on the Er K-edge (57.487 keV), the data in this part of the experiment was collected using transmission.

In order to minimize any problems due to noise, from both the sample having low dopant levels and moderately lower flux at these higher energies, it was decided to collect multiple data sets and then combine them. This had the effect of limiting the number of samples that could be collected.

Data analysis is still in the preliminary stages but has proved encouraging with the observation that the measurements of this type can be collected on systems such as these with low dopant levels (~0.3 atomic %).

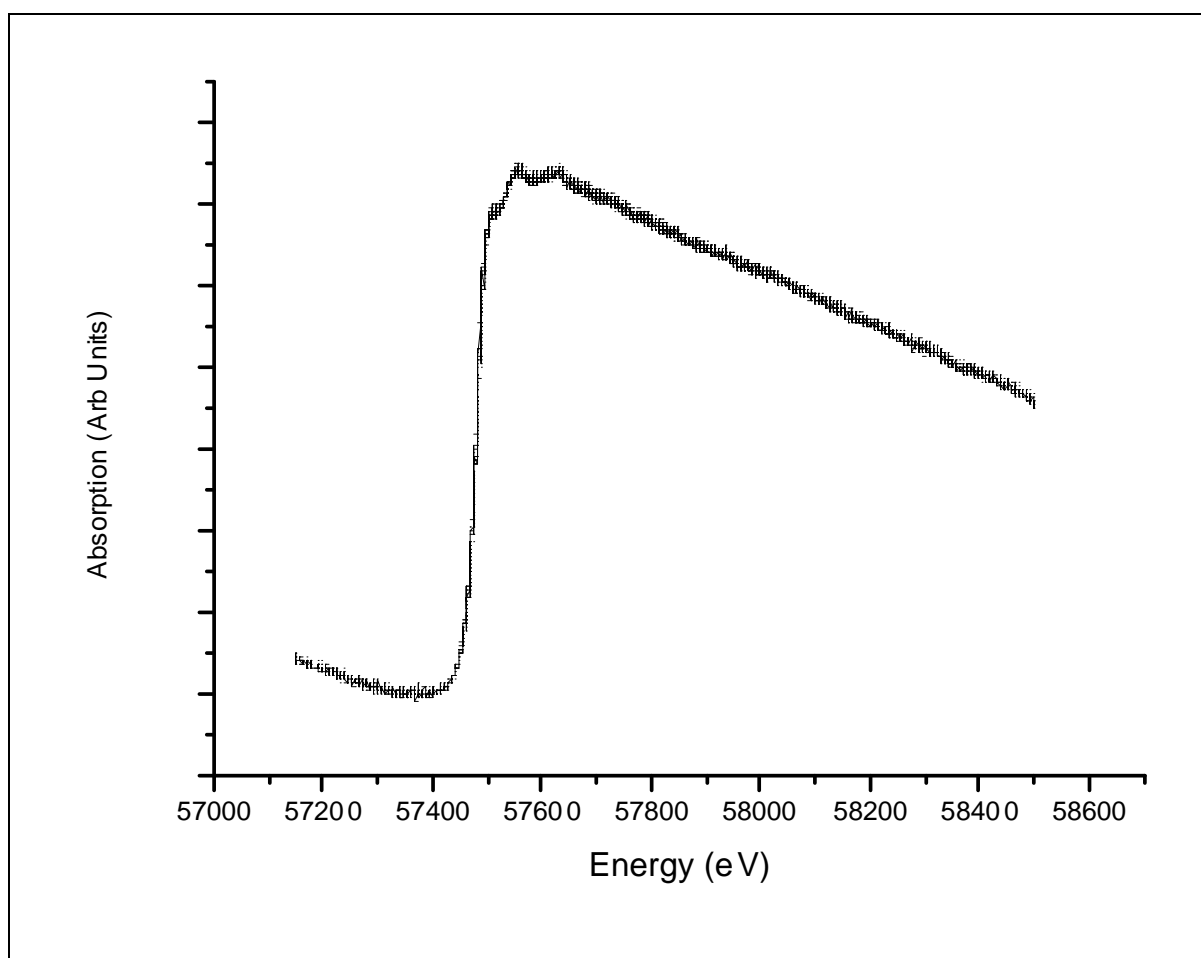


Figure 1 - Example of data collected from the Er K-edge.