



**ESRF**

**Experiment title:**

AXS Studies of Ca- and Ba-metaphosphate glasses doped with Europium.

**Experiment number:**

**CH-297**

**Beamline:**

D8  
GILDA-CRG

**Date of Experiment:**

from: 24 jan 97                      *to: 27 jan 97*

**Date of Report:**

25 feb 1997

**Shifts:**

**9**

**Local contact(s):**

S. Mobilio

*Receive at ESRF:*  
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**Report:**

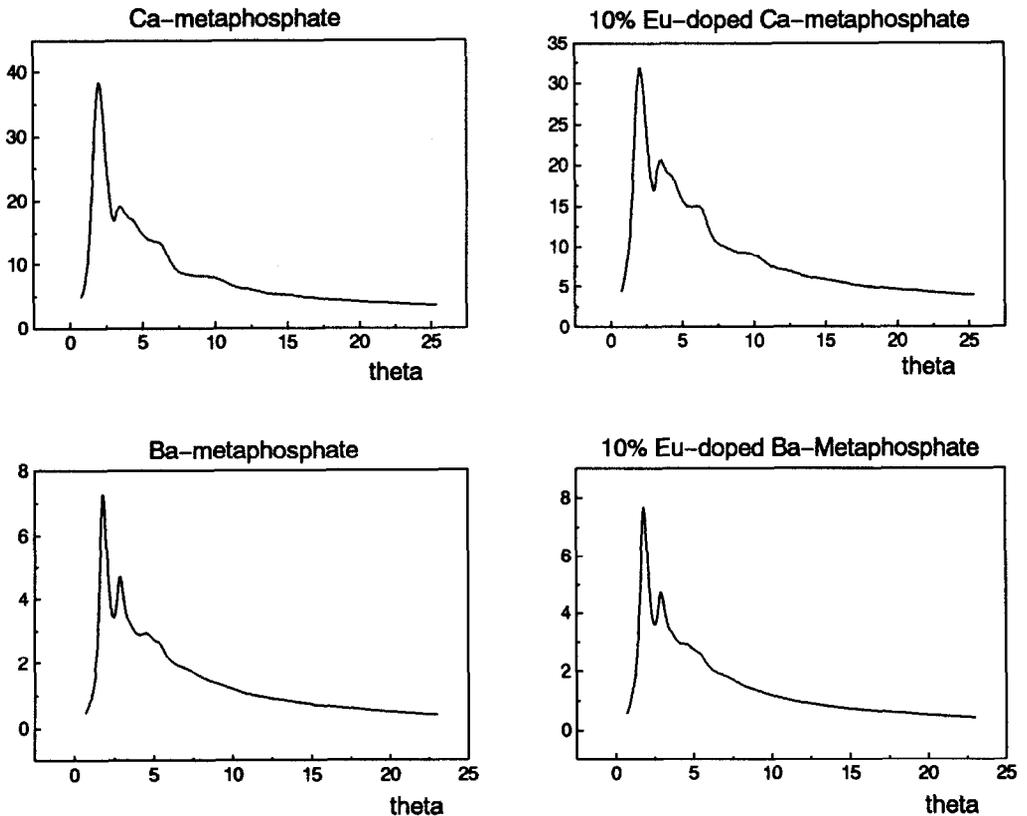
The aim of this experiment is to investigate by Anomalous X-ray Scattering (AXS) technique the structural properties of pure and 10% Eu doped Ca- and Ba- metaphosphate glasses.

Metaphosphate glasses doped with trivalent lanthanide ions are promising materials for the development of optical devices, like high power lasers and cathode-ray tubes. In these materials important optical properties such as the stimulated emission cross section, the luminescence linewidth, and the lifetime of the excited states depend in a critical way on the average crystal field experienced by the dopant ions. Since this average field is dictated by the local structure of the sites accomodating the  $\text{Ln}^{3+}$  impurity, a detailed knowledge of the nature of these sites is important in the prediction of the optical properties of the doped glasses allowing to establish correlations between the optical behavior and the composition of the host glass and the nature of the modifier cations present in the random network. In the well-known alkaline-earth metaphosphate glasses  $\text{M}(\text{PO}_3)_2$  (M= Ca, Sr, Ba), which are ideally composed of infinite  $-(\text{PO}_3)_n-$  chains, the modifier  $\text{M}^{2+}$  cations are linked to two adjacent

chains.

Preliminary results on the structural study of Sr-metaphosphate glass have been recently published [ 1].

We used the assigned beam time to record X-ray scattering data at about 25.5 keV on pure and Eu-doped Ca- and Ba- metaphosphate glasses. The interpretation of these data sets is still in progress. The differential method [2] will be able to provide structural information around the rare-earth dopant. Further beam time will be requested to perform AXS measurements around the Ba K-edge ( $E=37.451$  keV).



- [1] Anomalous X-ray Scattering on Sr and Sr-Eu Metaphosphate Glasses. M. Bionducci, C. Meneghini, G. Navarra, G. Licheri, A. Balerna and S. Mobilio, Applications of Synchrotron Radiation to Materials Science III, vol 437 MRS Symposium Proceedings Series, 1996.
- [2] M. Magini, A.F. Sedda, G. Licheri, G. Paschina, G. Piccaluga, G. Pinna, G. Cocco, J. Non-Cryst. Solids 65 (1984) 145.