

Extended X-Ray Absorption Fine Structure (EXAFS) spectra have been collected at the Pr-K edge as a function of the temperature in the range 300-20 K at the Pr K edge at BM-29 beamline of ESRF. The data collection has been made in transmission mode using a Si (311) monochromator. The data analysis was carried out taking advantage of the GNXAS and EXCURV98 programs. The experiment was carried out by measuring the Pr-K edge EXAFS of two samples. The first was a $(\text{Gd}_{0.99}\text{Pr}_{0.01})_3\text{Ga}_5\text{O}_{12}$ sample prepared by the coprecipitation method: this sample is nanocrystalline with an average size of the crystallites estimated to be around 45 nm by the XRPD line width analysis. A second, well crystallised sample was obtained from the previous one by firing it for 12 h at 1600 ° C in air.

From a qualitative point of view the Figure 1 shows the EXAFS FT of the two samples, while in Fig. 2 a comparison is shown of the EXAFS Ft for the two samples at RT and at 20 K.

A preliminary analysis of the EXAFS data shows:

- for both materials the first Pr coordination shell is rigid with Pr-O distances slightly longer than the crystallographic values
- in the nanopowder there is a significant degree of static disorder in the next nearest neighbours in comparison with the bulk material; the distances are coincident to the crystallographic ones
- all bond distances are independent of the temperature.

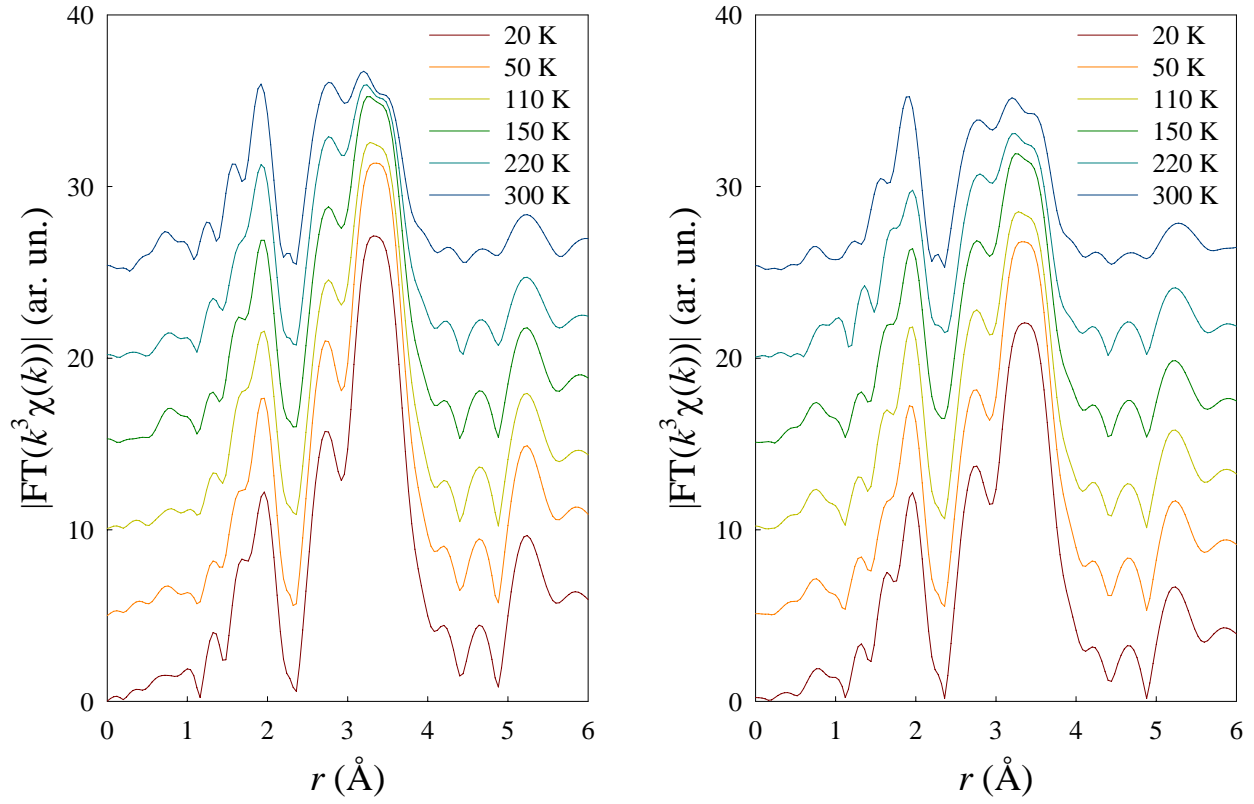


Figure 1.- EXAFS FT of the Pr-K edge of the $(\text{Gd}_{0.99}\text{Pr}_{0.01})_3\text{Ga}_5\text{O}_{12}$ samples at various temperatures. On the left panel the results for the well crystallized sample are shown, while on the right panel the same is made for the nanosized material.

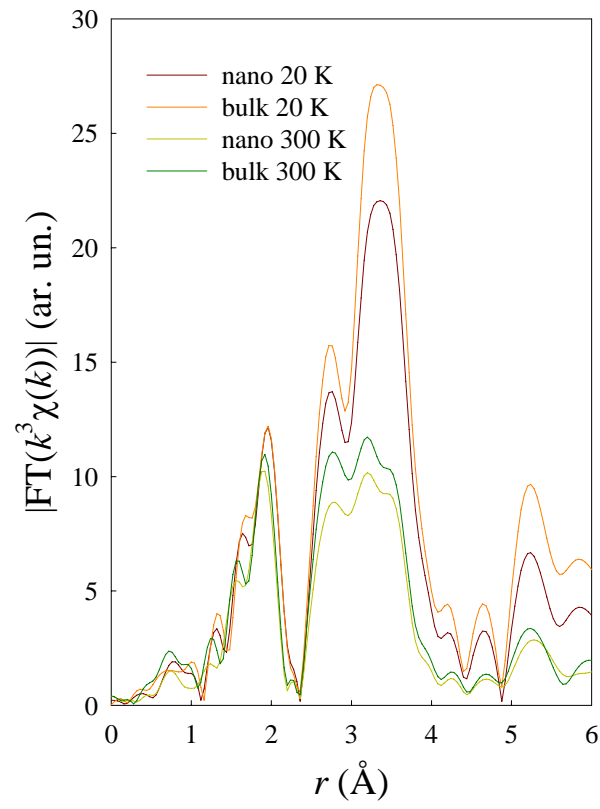


Figure 2- Comparison of the EXAFS FT for the two $(\text{Gd}_{0.99}\text{Pr}_{0.01})_3\text{Ga}_5\text{O}_{12}$ samples at room temperature and at 20 K.