	Experiment title: High-entropy rare-earth ortho-niobates	**Experiment number**: A08-1-1092
Beamline: BM08	**Date of experiment**: from: 20 Apr 2022 to: 27 Apr 2022	**Date of report**: 4 Nov 2022
Shifts: 5	**Local contact(s)**: Francesco D acapito and Michela Brunelli	*Received at ESRF:*

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Report:

Multicomponent oxide systems have gained significant interest over the past years. In this materials different atoms with different properties occupy the same crystallographic positions. Their physicochemical properties, such as structural, thermal and electrical can be easily modified by various substitutions. In this report we present the preliminary results of the experiment carried out at the LISA beamline (BM08) at ESRF of the $(La_{0.2}Nd_{0.2}Sm_{0.2}Gd_{0.2}\mathbf{RE}_{0.2})NbO_4$, where (RE = Y, Pr, Eu, Tb and Ho) series. The optimal amount of powder to obtain a good signal for each edge of all compounds was determined using the XAFSSMASS program (Klementiev & Chernikov, 2016). The weighted powders were then mixed with 50 mg of the celulose binder and pressed into the pellets, which were placed in the holder and then in the measuring chamber. The measurements were carried out under ultrahigh vacuum at 80 K in the transmission mode. The normalized X-ray absorption near edge spectroscopy (XANES) spectra of the La, Nd, Sm and Gd K-edges are presented in Figure 1.

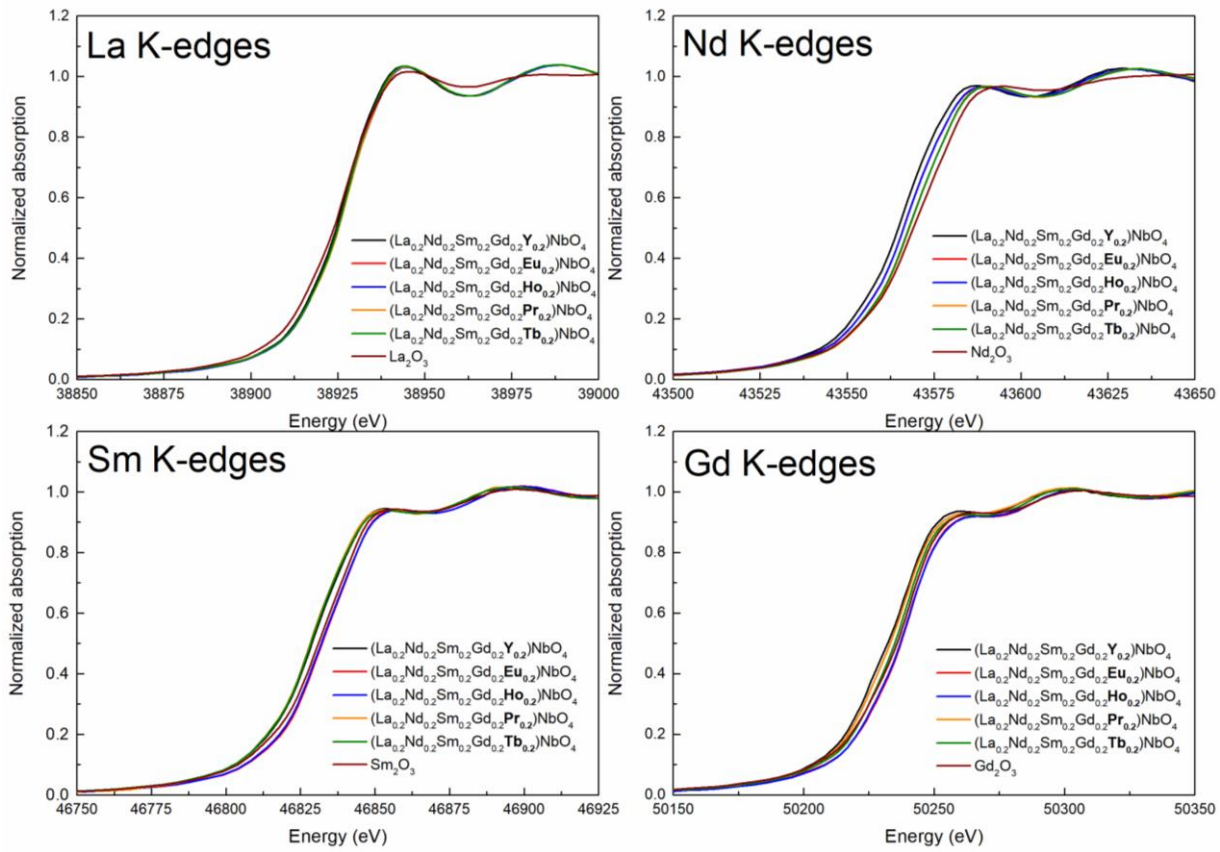

Figure 1. XANES spectra of La, Nd, Sm and Gd K-edges measured at 80 K.

The K-edges of the elements that make up the $(La_{0.2}Nd_{0.2}Sm_{0.2}Gd_{0.2}\mathbf{RE}_{0.2})NbO_4$ (RE = Y, Pr, Eu, Tb, and Ho) series were measured. Additionally, the K-edges of the reference oxides have been measured. It can be noticed that for the K-edges of neodymium, the maxima of the energy shift toward values lower than the reference (Nd_2O_3). By calculating the first derivative for each of the neodymium K-edges (Fig. 2), we obtained the edge position. These maxima shift as a function of energy which may be caused by local disorder. These are the preliminary results, and other analyses will be performed, for example, the EXAFS analysis on the simple models.

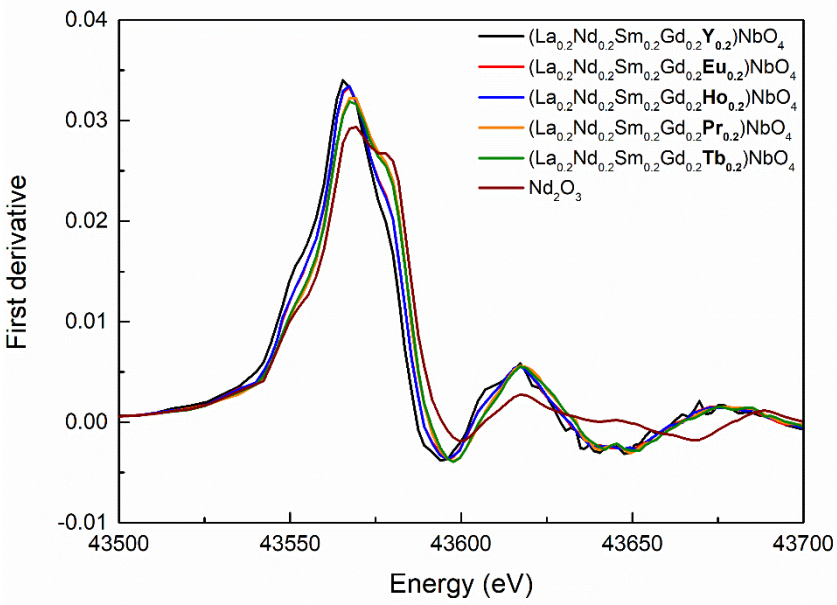

Figure 2. The first derivatives of Nd K-edges.