

Study of Temperature Dependence of Polar Clusters among Cubic $0.72\text{Pb}(\text{Mg}_{1/3}\text{Nb}_{2/3})\text{O}_3$ - 0.28PbTiO_3 Relaxor Ferroelectrics By mean of Synchrotron Radiation X-ray Diffraction

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X-ray diffraction experiments have been conducted to study the polar cluster for cubic $0.72\text{Pb}(\text{Mg}_{1/3}\text{Nb}_{2/3})\text{O}_3$ - 0.28PbTiO_3 relaxor ferroelectrics by means of synchrotron radiation x-ray successfully. X-ray with a wavelength of 1.29 angstrom transmitted the sample normally, and diffracted by polar clusters, diffraction patterns were recorded on CCD camera, just as shown in **Figure 1**. It was shown that the alignment of those polar clusters preferred quasi-periodic structures along $\langle 110 \rangle$ direction at temperatures above Curie temperature T_c . Obvious temperature dependence of polar clusters is observed firstly. Polar cluster emerges at about 600K. With the decreasing of temperature, quantity and projected size of polar clusters increase, This process becomes drastically at temperatures from 593K to 503K and becomes relative stable below 503K, with a stable projected cluster size of 18nm. These features indicate a structure dependence of the dielectric permittivity on clusters.

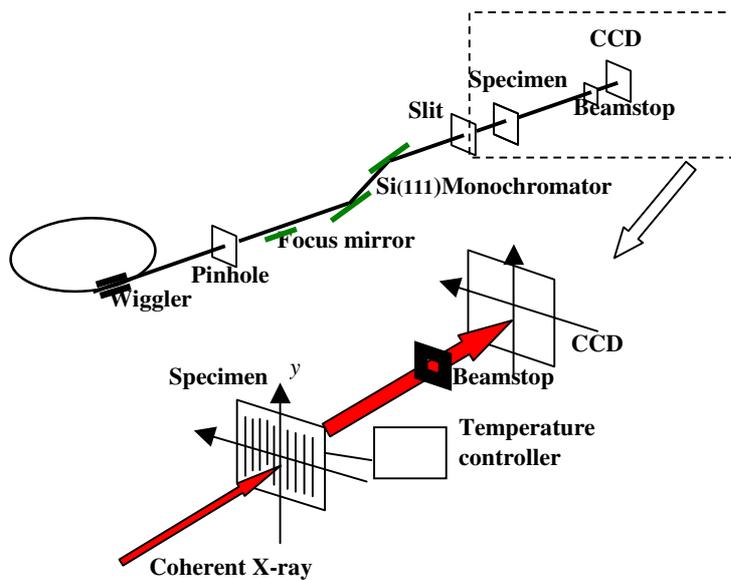


Figure 1 Experimental setup

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