The 18th KPSI Seminar
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Evolution of Mezzoscopic Domains in Ferroelectric BaTiO3 and Relaxer Ferroelectrics PMN-PT Observed by Soft X-ray Lasers

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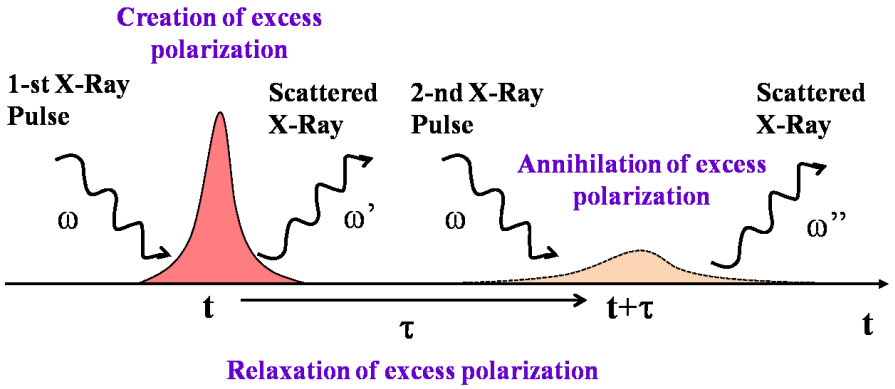
It is well known that some macroscopic properties of solid which can never be deduced into microscopic nature of crystal structure and electric states but originate inherently in the mesoscopic level hierarchy. Mesoscopic polarization structures such as polar nanoregions (PNRs) and polarization domain walls are certainly the matter of this kind that connecting microscopic fundamental polarization structures with macroscopic practical dielectric properties.

As a prototype example of this kind of mater, we adopted polarization clusters in ferroelectrics $BaTiO_3$ and domain walls in relaxor ferroelectrics PMN-PT. We had been investigated the behavior of these mezzoscopic structures at above and below the phase transition temperature by use of coherent soft X-ray laser pulse. We found that temporal polarization clusters observed in paraelectric phase of $BaTiO_3$ turned out into solid ones at 4 K above the Tc. We also found that oblique stripe 90° polarization domains evolved self assembly in PMN-27.8%PT.

At the seminar、I will introduce the results of speckle observation of these materials and the pump-probe type intensity correlation method (Fig.) developed for the study of the fluctuation of the polarization.



Intensity correlation spectroscopy by excitation and annihilation of excess polarization

Fig.