MS42.O03

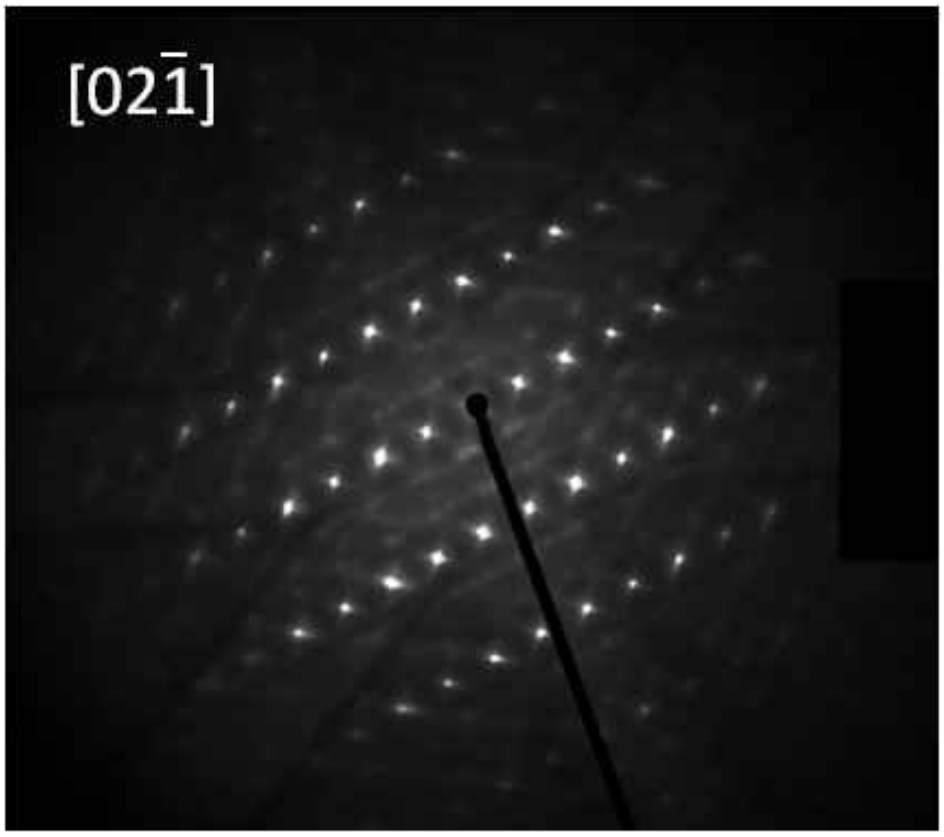
Energy-filtered electron diffuse scattering of ferroelectrics PMN and PMN-xPT

J. Pacaud[1], W. Saidi[1], R. Withers[3], B. Dkhil[4], J. Zuo[2]

[1]University of Poitiers, Pprime Institute, Poitiers, France, [2]University of Illinois at Urbana-Champaign, Department of Materials Science and Engineering, Urbana, USA, [3]Australian National University, Research School of Chemistry, Canberra, Australia, [4]Ecole Centrale de Paris, Structure Properties and Modelling of Solids, Paris, France

PbMb1/3Nb2/3O3 (PMN) and its solid solution (1-x)PbMb1/3Nb2/3O3-(x)PbTiO3 (PMN-xPT) are relaxor ferroelectrics which have attracted attention in the last few decades because of their very interesting dielectric and piezoelectric properties and have since be two of the most extensively studied. All the previous studies emphasized the role of the local structural fluctuations leading to local changes in symmetries [1] due to displacements of ions in the unit-cell. We studied PMN and PMN-xPT by electron diffuse scattering using an in-column energy filter and Imaging-Plates as detector. We found evidences for streaks of intensity along the [110]* direction as previously found in PbZn1/3Nb2/3O3 (PZN) with neutron diffraction [2]. Moreover, weak diffuse scattering sheets can be observed along (111)* reciprocal planes showing the existence of correlations along the [111] directions of the direct lattice. Figure 1 shows a diffraction pattern taken along [02-1] zone axis presenting both diffuse features. This can be related to the displacement of Pb ions along the diagonals of the cube found by simulation [3] but greatly complexify the analysis of the shape of the diffuse intensity. Compared to the neutron, electron diffraction has the advantage of two dimensional recording of diffuse scattering and eventually sensitivity to charge ordering but quantitative analysis is limited due to the complication of multiple scattering and the lack of sufficient energy resolution for the study of inelastic phonon scattering.

[1] *K.-H. Kim, D.A. Payne, J.M. Zuo, Phys. Rev. B, 86, 184113 (2012),* ***[2]*** *T.R. Welberry, D.J. Goossens, M.J. Gutmann, Phys. Rev. B, 74, 224108 (2006),* ***[3]*** *M. Pasciak, T.R. Welberry, J. Kulda et al. Phys. Rev. B, 85, 224109 (2012)*



Keywords: Electron diffuse scattering, Relaxor ferroelectrics, Perovskite