the intrinsic emission which arises due to the radiative annihilation of excitons self-trapped at the $(MoO_4)^{2-}$ complexes, so-called STE luminescence. PCL output strongly depends on temperature. Moreover, PCL output and PCL decay kinetics strongly depend on the x parameter. These dependences are significant not linear, while XRD analysis shows that the unit cell volume of PbxCa1–x MoO4 linearly decreases with increasing of x parameter. That is, according to the XRD analysis, these samples are solid solutions and the well-known Vegard's law is fulfilled. The failure to comply with Vegard's law in the luminescence parameters is associated with features of their band electron structure.

In $CaMoO_4$ (x = 0) PCL decay kinetics contains components in μs time range only. The decay time is greatly reduced when the x parameter increases. At x = 1 ($PbMoO_4$), the PCL decay kinetics contains at room temperature exclusively the short components in the ns-range. PbMoO4 has the lowest PCL quenching temperature range (less than 100 K) and the fastest PCL decay kinetics at room temperature. Finally, we believe, that $Pb_xCa_{1-x}MoO_4$ solid solutions can have potential application in cryogenic scintillating bolometers.

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FERROELECTRIC DOMAIN ORIENTATION MAPPING USING ELECTRON BACKSCATTER DIFFRACTION AND DYNAMICAL SCATTERING SIMULATIONS

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We have applied EBSD and dynamical scattering simulations for orientation mapping of domains in several ferroelectric crystals and ceramics. We have shown that proposed approach allows to distinguish all kinds of domains namely c- and a-domains in ferroelectric materials.

The contribution of ferroelectric domains is important to the large permittivity and piezoelectricity in many ferroelectric materials [1]. Significant work has been carried out for understanding domain structure configurations [2]. Orientation mapping brings crucial information to study the relationship between microstructure and properties in crystalline materials. There are several techniques for domain structure imaging. The most common are optical microscopy, piezoresponse force, selective chemical etching accompanied by scanning electron microscopy and atomic force microscopy. These

techniques have a number of drawbacks such as parasitic artificial contrast, destructiveness, difficulty to define the orientation of domains in ceramic materials or even in multiaxial single crystals. One of the most promising technique allowing to overcome mentioned above drawbacks is electron backscattered diffraction (EBSD). A number of papers were devoted to domain characterization by EBSD method and 90° domains have been thoroughly investigated in bulk ferroelectrics while the determination of full domain patterns including 180° domains remains challenging. In this work, we have applied EBSD and dynamical scattering simulations for orientation mapping of domains in several ferroelectric crystals and ceramics.

We have studied uniaxial periodically poled $LiNbO_3$ single crystal with 180° domains, multiaxial $Pb(Mn_{1/3}Nb_{2/3})O_3$-$PbTiO_3$ (PMN-PT) tetragonal ferroelectric single crystal and $BaTiO_3$ tetragonal ceramic. EBSD experiments were performed in a field-emission Carl Zeiss Dual-Beam SEM/FIB Auriga Crossbeam workstation operated at 20 kV with an electron probe current of 6 nA and equipped with Oxford Instrument Channel 5 EBSD system with Nordlys F+ detector. The EMsoft software was utilized to simulate dynamical EBSD patterns and dictionary indexing procedure based on a dot product metric was used [3].

We have shown that that the intrinsic intensity variations in experimental EBSD patterns that arise from dynamical scattering can be used to distinguish all kinds of domains namely c- and a-domains in ferroelectric single crystals as well as in ceramic materials. Moreover, the dictionary indexing approach with dynamical EBSD patterns allowed us to significantly improve orientation map quality in part of filling zero solutions and misindexing solving up to 100%.

The technique opens the possibility for mapping polar domain structures and absolute domain orientations in a variety of technologically important materials in a non-destructive manner. Moreover, taking into account development of modern hardware utilized for EBSD orientation mapping the technique could be extended to in-situ studies to observe how the population, and structure of ferroelectric domains evolve as a function of temperature and/or applied field.

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