the Cu2-Cu1 distance along the c-axis, exhibit also a non linear evolution with applied pressure that correlate with modifications of the in-phase oxygen mode and the apex oxygen mode frequencies respectively in the high pressure Raman spectrum [1],[2]. The correlation of the structural characteristics with the Raman frequency modifications and corresponding changes of T_c imply that the trigger of lattice instabilities lies among the CuO2 and BaO planes. Pressure-induced structural and microstructural modifications in the non-superconducting Pr123 cuprate, in the $La_{2-x}Sr_xCuO_4$ (x=0.0, 0.15) compounds and in the $YBa_2Cu_4O_8$ superconductor has been found to correlate also with corresponding modifications of the phonon frequencies and widths in the high pressure Raman spectrum supporting a model of lattice distortions and possible pressure-induced phase separation at the nanoscale.

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Keywords: high pressure X-ray diffraction; phase separation; high-T_c superconductors

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Twinning and Pseudosymmetry in Ferroic Materials at High Pressures. Karen Friese[a], Andrzej Grzechnik[a]. [a]*Department of Condesed Matter Physics, University of the Basque Country, Bilbao, Spain.*
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Ferroic phase transitions are characterized by the reduction of crystal symmetry as the material changes from the higher symmetrical to the lower symmetrical phase. This loss of symmetry is generally reflected in the appearance of a twin domain structure. In addition, the low-symmetry phase shows usually a strong pseudosymmetry with respect to the higher symmetry phase. Twinning and high pseudosymmetry can thus be understood as an indication of the existence of structural instabilities in the material under certain temperature and/or pressure conditions.

We are especially interested in the effect of pressure on ferroic materials. Due to the difficulties related to the in situ experiments at high pressures in diamond anvil cells, the characterization of pressure-induced ferroic phase transitions is not trivial [1,2]. We have analyzed the twinning and pseudosymmetry in a series of ferroic materials with a variety of crystal structures. The materials include mixed-valence vanadates with structures related to magnetoplumbite [1,2], disordered pyrochlore structures [3,4], scheelite related structures [5,6], ternary compounds in the system NaF-ThF_4 [7,8] and polar oxides with elements containing lone electron pairs [9].

We generally observe that, whether the pseudosymmetry is increased or decreased with increasing pressure depends –even within a family of isotypical compounds – entirely on the individual representative. The increase of pseudosymmetry might serve as an indication for the occurrence of a structural transition to a higher symmetrical phase at pressures not reached in the experiment.

Due to the limited information content of the high-pressure data it is not always possible to characterize the twinning in full detail. However, we were able to reliably refine twin volume fractions as a function of pressure in a number of cases.

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Magnetoresistance and Magnetocaloric Properties of $Ni_{50-x}Cu_xMn_{36}Sn_{14}$. Ilker Dincer[a], Yalcin Elerman[a]. [a]*Department of Engineering Physics, Ankara University, Ankara Turkey.*
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Compared with conventional refrigeration, magnetic refrigeration technology has many advantages, such as the absence of harmful gas, less noise, low cost and high efficiency. Magnetic refrigeration is based on the magnetocaloric effect (MCE) [1]. The giant MCE is observed when the transition is first order transition. The Heusler alloys $Ni_{50}Mn_{50-x}Sn_x$ show first order martensitic transition and giant MCE properties [2-3]. Since at the martensitic transition temperature, the resistance of these alloys shows a drastic change as a function of temperature and magnetic field, this type alloys show giant magnetoresistance effect (GMR). To improve magnetoresistance and magnetocaloric effet, we investigate the $Ni_{50-x}Cu_xMn_{36}Sn_{14}$ alloys (x=2, 4 and 6). The $Ni_{50-x}Cu_xMn_{36}Sn_{14}$ alloys are prepared by arc-melting under argon atmosphere. The compounds anneal at 950 ˚C for 2.5 days and then quench in ice water. The compositions of the compounds are found by EDS analysis. The $Ni_{50-x}Cu_xMn_{36}Sn_{14}$ alloys crystallize in the cubic $L2_1$ structure. The magnetic and resistivity measurements of compounds are performed by using PPMS between 5 and 350 K in ZFC, FC and FH modes. With increasing Cu content, the value of T_{Ms} temperature decreases. The $Ni_{50-x}Cu_xMn_{36}Sn_{14}$ (x=2 and 4) alloys show -%45 and -%40 GMR effect at 7 T. These two alloys exhibit inverse giant MCE in continuous and noncontinuous modes. For the $Ni_{48}Cu_2Mn_{36}Sn_{14}$ alloy, the magnetic entropy change is about 57 and 22 J/kg.K for continuous and noncontinuous modes, respectively.

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