

References:

- Adhlakha, N. and Yadav, K. L., Study of structural, dielectric and magnetic behaviour of $\text{Ni}_{0.75}\text{Zn}_{0.25}\text{Fe}_2\text{O}_4$ - $\text{Ba}(\text{Ti}_{0.85}\text{Zr}_{0.15})\text{O}_3$ composites, *Smart Mater. Struct.* 21, 115021, 2012.
- Ahart, M., Somayazulu, M., Cohen, R. E., Ganesh, P., Dera, P., Mao, H. k., Hemley, R. J., Ren, Yang, Liermann, P. and Wu, Z., Origin of morphotropic phase boundaries in ferroelectrics, *Nature* 451, 545, 2008.
- Aken, B. B. V., Palstra, T. T. M., Filippetti, A., and Spaldin, N. A., The origin of ferroelectricity in magnetoelectric YMnO_3 , *Nature* 3, 164, 2004.
- Arndt, H., Sauerbier, F., Schmidt, G., Shebanov, L., A., Field-induced phase transition in $\text{Pb}(\text{Mg}_{1/3}\text{Nb}_{2/3})\text{O}_3$ single crystals, *Ferroelectrics* 79, 145-148, 1988.
- Atou, T., Chiba, Ohoyama, H., K., Yamaguchi, Y. and Syono, Y., Structure Determination of Ferromagnetic Perovskite BiMnO_3 , *J. Solid State Chem.* 145, 639-645, 1999.
- Azuma, M., Takata, K., Saito, T., Ishiwata, S., Shimakawa, Y., Takano, M., Designed ferromagnetic, ferroelectric $\text{Bi}_2\text{NiMnO}_6$, *J. Am. Chem. Soc.* 127, 8889, 2005.
- Balagurov, B. V. and Vaks, V. G., Theory of diffuse phase transitions, *Sov. Phys. JETP* 38, 799, 1974.
- Bhattacharjee, S. and Pandey, D., Stability of the various crystallographic phases of the multiferroic $(1-x)\text{BiFeO}_3$ - $x\text{PbTiO}_3$ system as a function of composition and temperature, *J. Appl. Phys.* 107, 124112, 2010.
- Bhattacharjee, S., Tripathi, S. and Pandey, D., Morphotropic phase boundary in $(1-x)\text{BiFeO}_3$ - $x\text{PbTiO}_3$: Phase coexistence region and unusually large tetragonality, *Appl. Phys. Lett.* 91, 042903, 2007.
- Blinc, R., Dolinsek, J., Gregorovic, A., Zalar, B., Filipic, C., Kutnjak, Levstik, Z. A., Local polarization distribution and Edwards-Anderson order parameter of relaxor ferroelectrics, *Phys. Rev. Lett.* 83, 424, 1999.
- Bo, X. X., Li, G. S., Qiu, X. Q., Xue, Y. F. and Li, L. P., Magnetic diphase nanostructure of $\text{ZnFe}_2\text{O}_4/\gamma\text{-Fe}_2\text{O}_3$, *J. Solid State Chem.* 180, 1038, 2007.
- Bokov, A. A. and Ye, Z. G., Field-induced shift of morphotropic phase boundary and effect of overpoling in $(1-x)\text{Pb}(\text{Mg}_{1/3}\text{Nb}_{2/3})\text{O}_3$ - $x\text{PbTiO}_3$ piezocrystals, *Appl. Phys. Lett.* 92, 082901, 2008.

Bokov, A. A. and Ye, Z. G., Recent progress in relaxor ferroelectrics with perovskite structure, *J. Mater. Sci.* 41, 31-52, 2006.

Bokov, A. A. and Ye, Z. G., Recent progress in relaxor ferroelectrics with perovskite structure, *J. Mater. Sci.* 41, 31-52, 2006.

Bokov, A. A., Leshchenko. M. A., Malitskaya M. A. and Raevski, I. P., Dielectric spectra and Vogel-Fulcher scaling in $\text{Pb}(\text{In}_{0.5}\text{Nb}_{0.5})\text{O}_3$ relaxor ferroelectric, *J. Phys.: Cond. Matter* 11, 4899, 1999.

Boomgaard, J. V. D., Van Run, A. M. J. G. and Suchtelen, J. V., Magnetoelectricity in piezoelectric-magnetostrictive composites, *Ferroelectrics* 10, 295-298, 1976.

Boomgard, J. V. D. and Born, R. A. J., A sintered magnetoelectric composite material $\text{BaTiO}_3\text{-Ni}(\text{Co, Mn})\text{Fe}_2\text{O}_4$, *J. Mater. Sci.* 13, 1538, 1978.

Boomgard, J. V. D., Terrell, D. R., Born, R. A. J. and Giller, H. F. J. I., An *in situ* grown eutectic magnetoelectric composite material, *J. Mater. Sci.* 9, 1705-1709, 1974.

Boucher, B., Buhl, R. and Perrin, M., Structure magnetique du spinelle anti-ferromagnetique ZnFe_2O_4 , *Physica Stat. Solid.*, 40, 171-82, 1970.

Bragg, W. H., The structure of the spinel group of crystals, *Philosoph. Magaz.*, 30, 305-315, 1915.

Burns, G.; Dacol, F., Crystalline ferroelectrics with glassy polarization behaviour, *Physical Review B* 28, 2527, 1983.

Cai, N., Zhai, J., Nan, C. W., Lin, Y., Shi, Z., Dielectric, ferroelectric, magnetic, and magnetoelectric properties of multiferroic laminated composites, *Phys. Rev. B* 68, 224103, 2003.

Callister, W. D., Fundamentals of Materials Science and Engineering, *John Wiley & Sons, Inc., New York*, 2001.

Calvarin, G., Husson, E. and Z. G. Ye, X-ray study of the electric field-induced phase transition in single crystal $\text{Pb}(\text{Mg}_{1/3}\text{Nb}_{2/3})\text{O}_3$, *Ferroelectrics* 165, 349-358, 1995.

Carvajal, J. R., FULLPROF: A Rietveld refinement and pattern matching analysis program, laboratory leon brillouin (CEA-CNRS), France-2011. [<https://www.ill.eu/sites/fullprof/>;]

Carvajal, J. R., Recent developments of the program FULLPROF, Commission on powder diffraction (IUCr) *Newsletter* 26, 12-1, 2001.

Chaigneau, J., Kiat, J. M., Malibert, C. and Bogicevic, C., Morphotropic phase boundaries in $(\text{BiScO}_3)_{1-x}(\text{PbTiO}_3)_x$ ($0.60 < x < 0.75$) and their relation to chemical composition and polar order, *Phys. Rev. B* 76, 094111, 2007.

Chen, D. G., Tang, X. G., Liu, Q. X., Jiang, Y. P., Ma, C. B. and Li, R., Impedance response and dielectric relaxation in co-precipitation derived ferrite $(\text{Ni}, \text{Zn})\text{Fe}_2\text{O}_4$ ceramics, *J. Appl. Phys.* 113, 214110, 2013.

Cheong, S. W. and Mostovoy, M., Multiferroics: a magnetic twist for ferroelectricity, *Nature Mater.* 6, 13-20, 2007.

Choi, S. M., Stringer, C. J., Shrout, T. R. and Randall, C. A., Structure and property investigation of a Bi-based perovskite solid solution: $(1-x)\text{Bi}(\text{Ni}_{1/2}\text{Ti}_{1/2})\text{O}_3-x\text{PbTiO}_3$, *J. Appl. Phys.* 98, 034108, 2005.

Chougule, S. S. and Chougule, B. K., Response of dielectric behaviour on ferroelectric rich $y\text{Ni}_{0.8}\text{Zn}_{0.2}\text{Fe}_2\text{O}_4+(1-y)\text{PZT}$ ME composites, *Mater. Chem. Phys.* 108, 408-412, 2008.

Chougule, S. S., Chougule, B. K., Response of dielectric behavior and magnetoelectric effect in ferroelectric rich $x\text{Ni}_{0.9}\text{Zn}_{0.1}\text{Fe}_2\text{O}_4+(1-x)\text{PZT}$ ME composites, *J. Alloy. Compd.* 456, 441-446, 2008.

Chougule, S. S., Patil, D. R., Chougule, B. K., Electrical conduction and magnetoelectric effect in ferroelectric rich $x\text{Ni}_{0.9}\text{Zn}_{0.1}\text{Fe}_2\text{O}_4+(1-x)\text{PZT}$ ME composites, *J. Alloy. Compd.* 452, 205-209, 2008.

Chu, F., Setter, N. and Tagantsev, A. K., The spontaneous relaxor-ferroelectric transition of $\text{Pb}(\text{Sc}_{0.5}\text{Ta}_{0.5})\text{O}_3$, *J. Appl. Phys.* 74, 5129, 1993.

Ciomaga, C. E., Neagu, A. M., Pop, M. V., Airimioaei, M., Tascu, S., Schileo, G., Galassi, C., and Mitoseriu, L., Ferroelectric and dielectric properties of ferrite-ferroelectric ceramic composites, *J. Appl. Phys.* 113, 074103, 2013.

Cohen R. E., Materials science: Relaxors go critical *Nature* 441, 941-942, 2006.

Cohen, R. E., Origin of ferroelectricity in perovskite oxides, *Nature* 358, 136-138, 1992.

Colla EV, Koroleva EY, Okuneva NM, Vakhrushev SB., Long-time relaxation of the dielectric response in lead magnoniobate, *Phys. Rev. Lett.* 74, 1681, 1995.

Craciun, F., Galassi, C. and Birjega, R., Electric-field-induced and spontaneous relaxor-ferroelectric phase transitions in $(\text{Na}_{1/2}\text{Bi}_{1/2})_{1-x}\text{Ba}_x\text{TiO}_3$, *J. Appl. Phys.* 112, 124106, 2012.

Cross, L. E., Relaxor ferroelectrics, *Ferroelectrics* 76, 241-267, 1987.

Cross, L. E., Relaxor ferroelectrics: An overview, *Ferroelectrics* 151, 305-320, 1994.

Daniels, J. E., Jo, W., J. Rodel and Jones, J. L., Electric-field-induced phase transformation at a lead-free morphotropic phase boundary: Case study in a 93% $(\text{Bi}_{0.5}\text{Na}_{0.5})\text{TiO}_3$ -7% BaTiO_3 piezoelectric ceramic, *Appl. Phys. Lett.* 95, 032904, 2009.

David, W. I. F., Powder diffraction: Least-squares and beyond, *J. Res. Natl. Inst. Stand. Tech.* 109, 107-123, 2004.

Dmowski, W., S. B. Vakhrushev, I.-K. Jeong, M. P. Hehlen, F. Trouw, and T. Egamil, Local Lattice Dynamics and the Origin of the Relaxor Ferroelectric Behavior, *Phys. Rev. Lett.* 100, 137602, 2008.

Dong, S. X., Cheng, J. R., Li, J. F. and Viehland, D., Enhanced magnetoelectric effects in laminate composites of Terfenol- D/ $\text{Pb}(\text{Zr},\text{Ti})\text{O}_3$ under resonant drive, *Appl. Phys. Lett.* 83, 4812, 2003.

Durbin, M. K., Jacobs, E. W. and Hicks, J. C., Park, S. E., In situ x-ray diffraction study of an electric field induced phase transition in the single crystal relaxor ferroelectric 92% $\text{Pb}(\text{Zn}_{1/3}\text{Nb}_{2/3})\text{O}_3$ -8% PbTiO_3 , *Appl. Phys. Lett.* 74, 2848, 1999.

Eerenstein, W., Mathur, N. D. and Scott, J. F., Multiferroic and magnetoelectric materials, *Nature* 442, 729, 2006.

Feibeg, M., Revival of the magnetoelectric effect, *J. Phys. D: Appl. Phys.* 38, R123, 2005.

Filho A. G. S., Lima, K. C. V., Ayala, A. P., Guedes, I., Freire, P. T. C., Filho, J. M., Araújo, E. B. and Eiras, J. A., Monoclinic phase of $\text{PbZr}_{0.52}\text{Ti}_{0.48}\text{O}_3$ ceramics: Raman and phenomenological thermodynamic studies, *Phys. Rev. B* 61, 14283 (2000).

Freeman, A. J. and Schmid, H., Magnetoelectric interaction phenomena in crystals (London: Gordon and Breach) 1975.

Fu, D., Taniguchi, H., Itoh, M., Koshihara, S., Yamamoto, N., Moris, S., Relaxor $\text{Pb}(\text{Mg}_{1/3}\text{Nb}_{2/3})\text{O}_3$: A ferroelectric with multiple inhomogeneities, *Phys. Rev. Lett.* 103, 207601, 2009.

Fu, H. and Cohen, R. E., Polarization rotation mechanism for ultrahigh electro-mechanical response in single-crystal piezoelectrics, *Nature* 403, 281, 2000.

Fu, J., Zuo, R., Wu, S. C., Jiang, J. Z., Li, L., Yang, T. Y., Wang, X. and Li, L., Electric field induced intermediate phase and polarization rotation path in alkaline niobate based piezoceramics close to the rhombohedral and tetragonal phase boundary, *Appl. Phys. Lett.* 100, 122902, 2012.

Fujii, I., Nakashima, K., Kumada, N. and Wada, S., Structural, dielectric, and piezoelectric properties of $\text{BaTiO}_3\text{-Bi}(\text{Ni}_{1/2}\text{Ti}_{1/2})\text{O}_3$ ceramics, *J. Ceram. Soc. Jpn.* 120, 30-34, 2012.

Fulcher, G. S., Analysis of recent measurements of the viscosity of glasses, *J. Am. Ceram. Soc.* 8, 339, 1925.

Glazer, A. M., Thomas, P. A., Kishi, K. Z. B., Pang, G. K. H. and Tai, C. W., Influence of short-range and long-range order on the evolution of the morphotropic phase boundary in $\text{Pb}(\text{Zr}_{1-x}\text{Ti}_x)\text{O}_3$, *Phys. Rev. B* 70, 184123, 2004.

Globus, A., Pascard, H. and Cagan, V., Distance between magnetic ions and fundamental properties in ferrites, *J. Phys. Colloques* 38, C1-163-C1-168, 1977.

Goldschmidt, V. M., Strifter Norske Videnskaps Akad (Oslo), I: Mat. Naurr., KI. No.2, p.8, 1926.

Guo, R., Cross, L. E., Park, S. E., Noheda, B., Cox, D. E. and Shirane, G., Origin of the high piezoelectric response in $\text{PbZr}_{1-x}\text{Ti}_x\text{O}_3$, *Phys. Rev. Lett.* 84, 5423, 2000.

Guo, R., Bhalla, A. S., Randall, C. A. and Cross, L. E., Dielectric and pyroelectric properties of the morphotropic phase boundary lead barium niobate (PBN) single crystals at low temperature (10-300K), *J. Appl. Phys.* 67, 6405, 1990.

Guo, Y., Luo, H., Chen, K., Xu, H., Zhang, X., and Yin, Z., Effect of composition and poling field on the properties and ferroelectric phase-stability of $\text{Pb}(\text{Mg}_{1/3}\text{Nb}_{2/3})\text{O}_3\text{-PbTiO}_3$ crystals, *J. Appl. Phys.* 92, 6134, 2002.

Harshe, G., Dougherty, J. P. and Newnham, R. E., Theoretical modelling of multilayer magnetoelectric composites, *Int. J. Appl. Electromagn. Mater.* 4, 145, 1993.

Haumont, R., Al-Barakaty, A., Dkhil, B., Kiat, J. M., and Bellaiche, L., Morphotropic phase boundary of heterovalent perovskite solid solutions: Experimental and theoretical investigation of $\text{Pb}(\text{Sc}_{1/2}\text{Nb}_{1/2})\text{O}_3$ - PbTiO_3 , *Phys. Rev. B* 71, 104106, 2005.

Haumont, R., Dkhil, B., Kiat, J. M., Barakaty, A. A., Dammak, H., and Bellaiche, L., Cationic-competition-induced monoclinic phase in high piezoelectric $(\text{PbSc}_{1/2}\text{Nb}_{1/2}\text{O}_3)_{1-x}$ - $(\text{PbTiO}_3)_x$ compounds, *Phys. Rev. B* 68, 14114, 2003.

Hewat, A. W., Harwell Report No. 73/239, 1973 and ILL Report No. 74/H62S, 1974.

Hill, N. A., Density functional studies of multiferroic magnetoelectrics, *Annu. Rev. Mater. Res.* 32, 1-37, 2002.

Hill, N. A., Why Are There so few magnetic ferroelectrics? *J. Phys. Chem. B*, 104, 6694-6709, 2000.

Hill, R. J, Craig, J. R. and Gibbs, G. V., Systematics of the spinel structure type. *Phys. Chem. Miner.*, 4, 317-39, 1979.

Hu, P., Chen, J., Deng, J., and Xing, X., Thermal expansion, ferroelectric and magnetic properties in $(1-x)\text{PbTiO}_3$ - $x\text{Bi}(\text{Ni}_{1/2}\text{Ti}_{1/2})\text{O}_3$, *J. Am. Chem. Soc.* 132, 1925, 2010.

Hu, P., Chen, J., Yu, Z., Zhou, L., Denga, J. and Xing, X., High piezoelectric and mechanical performances in multiferroic $(1-x-y)\text{PbTiO}_3$ - $x\text{Bi}(\text{Ni}_{1/2}\text{Ti}_{1/2})\text{O}_3$ - $y\text{BiScO}_3$, *J. Mater. Chem.* 22, 6311, 2012.

Hu, P., Kang, H., Chen, J., Deng, J. and Xing, X., Magnetic enhancement and low thermal expansion of $(1-x-y)\text{PbTiO}_3$ - $x\text{Bi}(\text{Ni}_{1/2}\text{Ti}_{1/2})\text{O}_3$ - $y\text{BiFeO}_3$, *J. Mater. Chem.* 21, 16205, 2011.

Inaguma, Y. and Katsumata, T., High pressure synthesis, lattice distortion, and dielectric properties of a perovskite $\text{Bi}(\text{Ni}_{1/2}\text{Ti}_{1/2})\text{O}_3$, *Ferroelectrics* 286, 111-117, 2003.

Isupov, V. A., Properties of $\text{Pb}(\text{Ti},\text{Zr})\text{O}_3$ piezoelectric ceramics and nature of their orientational dielectric polarization, *Sov. Phys. Solid State* 10, 989 (1968).

Jacobson, A. J. and Fender, B. E. F., A neutron diffraction study of the nuclear and magnetic structure of BiFeO_3 , *J. Phys. C* 8, 844, 1975.

Jadhav, P. A., Shelar, M. B., Chougule, S. S, Chougule, B. K., Synthesis and magnetoelectric properties of $y(Ni_{0.3}Cu_{0.4}Zn_{0.3}Fe_2O_4)+(1-y)[50\%BaTiO_3+50\%PZT]$ ME composites, *J. Alloy. Compd.* 490, 195-199, 2010.

Jaffe, B., Cook, W. R., and Jaffe, H., Piezoelectric ceramics, *Academic Press*, London, 1971.

Jianga, S., Zhua, Z., Zhang, L., Xionga, X., Yia, J., Zeng, Y., Liub, W., Wangc, Q., Hanc, K. and Zhang, G., Electrical properties of $Bi(Ni_{1/2}Ti_{1/2})O_3-PbTiO_3$ high- T_C piezoelectric ceramics fabricated by the microwave sintering process, *Mater. Sci. Eng. B* 179, 36, 2014.

Jin, Y. M., Wang, Y. U., Khachaturyan, A. G., Li, J. F. and Viehland, D., Conformal miniaturization of domains with low domain-wall energy: monoclinic ferroelectric states near the morphotropic phase boundaries, *Phys. Rev. Lett.* 91, 197601, 2003.

Jones, J. L., Aksel, E., Tutuncu, G., Usher, T. M., Chen, J., Xing, X. and Studer, A. J., Domain wall and interphase boundary motion in a two-phase morphotropic phase boundary ferroelectric: Frequency dispersion and contribution to piezoelectric and dielectric properties, *Phys. Rev. B* 86, 24104, 2012.

Kaczmarek, W. and Pajak, Z., Differential thermal analysis of phase transitions in $(Bi_{1-x}La_x)FeO_3$ solid solution, *Solid State Commun.* 17, 807, 1975.

Kadam, S. L., Kanamadi, C. M., Patankar, K. K., Chougule, B. K., Dielectric behaviour and magnetoelectric effect in $Ni_{0.5}Co_{0.5}Fe_2O_4+Ba_{0.8}Pb_{0.2}TiO_3$ ME composites, *Mater. Lett.* 59, 215- 219, 2005.

Kambalea, R. C., Shaikha, P. A., Bhosalea, C. H., Rajpurea, K. Y. and Kolekarb, Y. D., Studies on magnetic, dielectric and magnetoelectric behavior of $xNiFe_{1.9}Mn_{0.1}O_4$ and $(1-x) BaZr_{0.08}Ti_{0.92}O_3$ magnetoelectric composites, *J. Alloys Compd.* 489, 310, 2010.

Kang, H., Chen, J., Liu, L., Hu, C., Fang, L. and Xing, X., Preparation and electrical properties of high- T_C piezoelectric ceramics of strontium-substituted $Bi(Ni_{1/2}Ti_{1/2})O_3-PbTiO_3$, *J. Am. Ceram. Soc.* 95, 1170, 2012.

Kang, H., Chen, J., Liu, L., Hu, C., Fang, L. and Xing, X., Structure and enhanced piezoelectric response by chemical doping in $PbTiO_3-PbZrO_3-Bi(Ni_{1/2}Ti_{1/2})O_3$, *Inorg. Chem. Commun.* 31, 66, 2013.

Kang, H., Chen, J., Liu, L., Hu, C., Fang, L., Xing, X., Influences of oxide chemical modified on microstructure and electrical properties of PbTiO_3 - $\text{Bi}(\text{Ni}_{1/2}\text{Ti}_{1/2})\text{O}_3$, *Inorg. Chem. Commun.* 27, 9-12, 2013.

Khadar, M. A., Biju, V. and Inoue, A., Effect of finite size on the magnetization behavior of nanostructured nickel oxide, *Mater. Res. Bull.* 38, 1341, 2003.

Khalyavin, D. D., Salak, A. N., Vyshatko, N. P., Lopes A. B., Olekhovich N. M., Pushkarev, A. V., Maroz, I. I. and Radyush, Y. V., Crystal structure of metastable perovskite $\text{Bi}(\text{Mg}_{1/2}\text{Ti}_{1/2})\text{O}_3$: Bi-based structural analogue of antiferroelectric PbZrO_3 , *Chem. Mater.* 18, 5104, 2006.

Khattak, C. P. and Cox, D. E., Profile analysis of X-ray powder diffractometer data: structural refinement of $\text{La}_{0.75}\text{Sr}_{0.25}\text{CrO}_3$, *J. Appl. Cryst.* 10, 405, 1977.

Khomskii, D.I., Multiferroics: Different ways to combine magnetism and ferroelectricity, *J. Mag. Mag. Mater.* 306, 1-8, 2006.

Kingery, W. D., Introduction to Ceramics, *Wiley, London*, p.720, 1988.

Kittel, C., Theory of antiferroelectric crystals, *Phys. Rev.* 82, 729, 1951.

Kleemann, W., Albertini, A., Chamberlin, R. V., Bednorz, J. G., Dynamic behavior of polar nanodomains in $\text{Sr}_{1-x}\text{Ca}_x\text{TiO}_3$, $x=0.002$, *Euro. Phys. Lett.* 37, 145-50, 1997.

Koops, C. G., On the dispersion of resistivity and dielectric constant of some semiconductors at audio frequencies, *Phys. Rev.* 83, 121, 1951.

Kothale, M. B., Patankar, K. K., Rao, A. V., Mathe, V. L. and Chougule, B. K., Electrical conduction and magnetoelectric effect in $\text{Cu}_{0.4}\text{Co}_{0.6}\text{Fe}_2\text{O}_4$ - $\text{Ba}_{0.8}\text{Pb}_{0.2}\text{TiO}_3$ ME composites, *Ferroelectrics* 325, 143-149, 2005.

Kumar, M. M., Srinivas, A., Suryanarayana, S. V., Kumar, G. S. and Bhimsankaram, T., An experimental setup for dynamic measurement of magnetoelectric effect, *Bull. Mater. Sci.* 21, 251-255, 1998.

Kuwata, J., Uchino, K., and Nomura, S., Phase transitions in the $\text{Pb}(\text{Zn}_{1/3}\text{Nb}_{2/3})\text{O}_3$ - PbTiO_3 system, *Ferroelectrics* 37, 579, 1981.

Lee, D. S., Lim, D. H., Kim, M. S., Kim, K. H. and Jeong, S. J., Electric field-induced deformation behavior in mixed $\text{Bi}_{0.5}\text{Na}_{0.5}\text{TiO}_3$ and $\text{Bi}_{0.5}(\text{Na}_{0.75}\text{K}_{0.25})_{0.5}\text{TiO}_3$ - BiAlO_3 , *Appl. Phys. Lett.* 99, 062906, 2011.

Lente, M. H., Zanin, A. L., Andreeita, E. R. M., Santos, I. A., Garcia, D. and Eiras, J. A., Investigation of dielectric anomalies at cryogenic temperatures in (1-x)Pb(Mg_{1/3}Nb_{2/3})O₃-PbTiO₃ system, *Appl. Phys. Lett.* 85, 982, 2004.

Li, Z., Xu, Z., Yao, X., and Cheng, Z., Y., Phase transition and phase stability in [110]-, [001]-, and [111]-oriented 0.68Pb(Mg_{1/3}Nb_{2/3})O₃-0.32PbTiO₃ single crystal under electric field *J. Appl. Phys.* 104, 024112, 2008.

Liang, L., Wencong, L. and Nianyi, C., On the criteria of formation and lattice distortion of perovskite-type complex halides, *J. Phys. Chem. Solid.*, 65, 855-860, 2004.

Lines, M. E., Glass, A. M., Principles and applications of ferroelectrics and related materials, *Oxford University Press*: Oxford, UK, 1977.

Ma, C., Guo, H., Beckman., S. P. and Tan, X., Creation and destruction of morphotropic phase boundaries through electrical poling: A case study of lead-free (Bi_{1/2}Na_{1/2})TiO₃-BaTiO₃ piezoelectrics, *Phys. Rev. Lett.* 109, 107602, 2012.

Malmros, G. and Thomas, J. O., Least-squares structure refinement based on profile analysis of powder film intensity data measured on an automatic microdensitometer, *J. Appl. Cryst.* 10, 7, 1977.

Martienssen, W. and Warlimont, H., Springer Handbook of Condensed Matter and Materials Data XVIII, 904, 2005.

Mathan, N., Husson, E., Calvarin, G., Gavarri, J. R., Hewat, A. W., Morell, A., A Structural model for the relaxor PbMg_{1/3}Nb_{2/3}O₃ at 5K, *J. Phys. Condens. Matter.* 3, 8159, 1991.

Mathe, V. L., Patankar, K. K., Jadhav, U. V., Patil, A. N., Lotake, S. D. and Patil, S. A., Studies on structural, dielectric and magnetoelectric properties in CuFe_{1.8}Cr_{0.2}O₄-Pb(Mg_{1/3}V_{2/3})O₃ composites, *Ceram. Intern.* 27, 531, 2001.

Mc-Cusker, L. B., Dreele V., R. B., Cox, D. E. , Louër, D. and Scardi, P., Rietveld refinement guidelines, *J. Appl. Cryst.* 32, 36-50, 1999.

Mishra, S. K., Pandey, D. and Singh, A. P., Effect of phase coexistence at morphotropic phase boundary on the properties of Pb (Zr_xTi_{1-x})O₃ ceramics, *Appl. Phys. Lett.* 69, 1707-1709, 1996.

Mitoseriu, L., Stancu, A., Fedor, C. and Vilarinho, P. M., Analysis of the composition-induced transition from relaxor to ferroelectric state in Pb(Fe_{2/3}W_{1/3})O₃-PbTiO₃ solid solutions, *J. Appl. Phys.* 94, 1918, 2003.

Mostovoy, M., Ferroelectricity in spiral magnets, *Phys. Rev. Lett.* 96, 067601, 2006.

Nan, C. W. and Clarke, D. R., Effective Properties of Ferroelectric and/or Ferromagnetic Composites: A Unified Approach and Its Application, *J. Am. Ceram. Soc.* 80, 1333, 1997.

Nan, C. W., Bichurin, M. I., D., Shuxiang, Viehland, D. and Srinivasan, G., Multiferroic magnetoelectric composites: Historical perspective, status, and future directions, *J. Appl. Phys.* 103, 031101, 2008.

Nan, C. W., Calculations of giant magnetoelectric effects in ferroic composites of rare-earth-iron alloys and ferroelectric polymers, *Phys. Rev. B* 63, 144415, 2001.

Nan, C. W., Magnetoelectric effect in composites of piezoelectric and piezomagnetic phases, *Phys. Rev. B* 50, 6082, 1994.

Nan, C. W., Physics of inorganic inhomogeneous materials, *Prog. Mater. Sci.* 37, 1, 1993.

Nishikawa, S., Structure of some crystals of the spinel group, *Proc. Mathem. Phys. Soc. Tokyo*, 8, 199-209, 1915.

Noheda, B., Gonzalo, J. A., Cross, L. E., Gao, R., Park, S. E., Cox, D. E. and Shirane, G., Tetragonal-to-monoclinic phase transition in a ferroelectric perovskite: The structure of $\text{PbZr}_{0.52}\text{Ti}_{0.48}\text{O}_3$, *Phys. Rev. B* 61, 8687, 2000.

Noheda, B., Cox, D. E., Shirane, G., Gonzalo, J. A., Cross, L. E. and Park, S. E., A monoclinic ferroelectric phase in the $\text{Pb}(\text{Zr}_{1-x}\text{Ti}_x)\text{O}_3$ solid solution, *Appl. Phys. Lett.* 74, 2059, 1999.

Okuda, T., Yamada, M. and Takenaka, T., Piezoelectric properties of solid-solution $(\text{Bi}_{1-x}(\text{PbBa})_x)(\text{Ni}_{1-x/2}\text{Ti}_{1+x/2})\text{O}_3$ Ceramics, *Jpn. J. Appl. Phys.* 33, 5356, 1994.

Orauttapong, D. L., Noheda, B., Ye, Z. G., Gehring, P. M., Toulouse, J., Cox, D. E. and Shirane, G., Phase diagram of the relaxor ferroelectric $(1-x)\text{Pb}(\text{Zn}_{1/3}\text{Nb}_{2/3})\text{O}_3-x\text{PbTiO}_3$, *Phys. Rev. B* 65, 144101, 2002.

Paik, D. S., Komarneni, S., Abooth, I. R. and Rao, A. V. P., Composites of $0.3\text{Pb}(\text{Mg}_{1/3}\text{Nb}_{2/3})\text{O}_3-0.7\text{Pb}(\text{Zr}_{0.52}\text{Ti}_{0.48})\text{O}_3$ prepared by a sol-gel method, *J. Mater. Chem.* 7, 1831-1835, 1997.

Pandey, D., Singh, A. K. and Baik, S., Stability of ferroic phases in the highly piezoelectric $\text{Pb}(\text{Zr}_x\text{Ti}_{1-x})\text{O}_3$ ceramics, *Acta Cryst. A* 64, 192-203, 2008.

Pandey, R. and Singh, A. K., Electric field induced cubic to monoclinic phase transition in multiferroic $0.65\text{Bi}(\text{Ni}_{1/2}\text{Ti}_{1/2})\text{O}_3$ - 0.35PbTiO_3 solid solution, *Appl. Phys. Lett.* 105, 162901, 2014.

Pandey, R. and Singh, A. K., Presence of a monoclinic (Pm) phase in the morphotropic phase boundary region of multiferroic $(1-x)\text{Bi}(\text{Ni}_{1/2}\text{Ti}_{1/2})\text{O}_3$ - $x\text{PbTiO}_3$ solid solution: A Rietveld study, *J. Appl. Phys.* 116, 044102, 2014.

Pandey, R., Pillutla, R. K., Shankar, U., and Singh, A. K., Absence of tetragonal distortion in $(1-x)\text{SrTiO}_3$ - $x\text{Bi}(\text{Zn}_{1/2}\text{Ti}_{1/2})\text{O}_3$ solid solution, *J. Appl. Phys.* 113, 184109, 2013.

Pandey, R., Tiwari, A., Upadhyay, A. and Singh, A. K., Phase coexistence and the structure of the morphotropic phase boundary region in $(1-x)\text{Bi}(\text{Mg}_{1/2}\text{Zr}_{1/2})\text{O}_3$ - $x\text{PbTiO}_3$ solid solution, *Acta Mater.* 76, 198-206, 2014.

Pandey, R., Meena, B. R., Singh, A. K., Structural and dielectric characterization on multiferroic $x\text{Ni}_{0.9}\text{Zn}_{0.1}\text{Fe}_2\text{O}_4$ / $(1-x)\text{PbZr}_{0.52}\text{Ti}_{0.48}\text{O}_3$ particulate composite, *J. Alloy. Compd.* 593, 224-229, 2014.

Park, S. E. and Shrout, T. R., Ultrahigh strain and piezoelectric behavior in relaxor based ferroelectric single crystals, *J. App. Phys.* 82, 1804, 1997.

Patil, D. R., Lokare, S. A., Devan, R. S., Chougule, S. S., Kolekar, Y. D., Chougule, B. K., Dielectric properties and magnetoelectric effect of $x\text{NiFe}_2\text{O}_4+(1-x)\text{Ba}_{0.8}\text{Sr}_{0.2}\text{TiO}_3$ composites, *J. Phys. Chem. Solid.* 68, 1522-526, 2007.

Perovski, L. A., Perovskite mineral data [<http://webmineral.com/data/Perovskite.shtml>]

Pirc, R. and Blinc, R., Vogel-Fulcher freezing in relaxor ferroelectrics, *Phys. Rev. B* 76, 020101(R), 2007.

Pradhan, A. K., Zhang, K., Hunter, D., Dadson, J. B., Loijuts, G. B., Bhattacharya, P., Katiyar, R., Zhang, J., Sellmyer, D. J., Roy, U. N., Cui, Y., and Burger, A., Magnetic and electrical properties of single-phase multiferroic BiFeO_3 , *J. Appl. Phys.* 97, 093903, 2005.

Praveena, K. and Varma, K. B. R., Improved magneto-electric response in $\text{Na}_{0.5}\text{Bi}_{0.5}\text{TiO}_3$ - MnFe_2O_4 composites, *J. Mater. Sci.: Mater. Electro.* 25, 111-16, 2014.

Prince, E., Mathematical techniques in crystallography and materials science, 3rd ed., *Springer*, New York, 2004.

Priya, S., Viehland, D. and Uchino, K., Importance of structural irregularity on dielectric loss in $\text{Pb}(\text{Mg}_{1/3}\text{Nb}_{2/3})\text{O}_3$ - PbTiO_3 crystals, *Appl. Phys. Lett.* 80, 4217, 2002.

Qi, T., Grinberg, I. and Rappe, A. M., Correlations between tetragonality, polarization and ionic displacement in PbTiO_3 -derived ferroelectric perovskite solid solution, *Phys. Rev. B* 82, 134113, 2010.

Rado, G. T. and Folen, V. J., Magnetoelectric effects in antiferromagnetics, *J. Appl. Phys.* 33, 1126, 1962.

Rado, G. T. and Folen, V. J., Observation of the magnetically induced anetoelectric effect and evidence for antiferromagnetic domains, *Phys. Rev. Lett.* 7, 310, 1961.

Ragini, Mishra, S. K., Pandey, D., Lemmens, H., and Tendeloo, G. V., Evidence for another low-temperature phase transition in tetragonal $\text{Pb}(\text{Zr}_x\text{Ti}_{1-x})\text{O}_3$ ($x=0.515, 0.520$), *Phys. Rev. B* 64, 054101, 2001.

Ramana, M. V., Reddy, N. R., Kumar, S. K. V., Murthy, V. R. K., and Murty, B. S., *Mod. Phys. Lett. B*, 25, 345-358, 2011.

Ramesh, R. and Spaldin, N. A., Multiferroics: Progress and prospects in thin films, *Nature Mater.* 6, 21-29, 2007.

Ramesh, R., Emerging routes to multiferroics, *Nature* 461, 1218, 2009.

Rao W. F. and Wang, Y. U., Microstructures of coherent phase decomposition near morphotropic phase boundary in lead zirconate titanate, *Appl. Phys. Lett.* 91, 052901, 2007.

Rao, B. N. and Ranjan, R., Electric-field-driven monoclinic-to-rhombohedral transformation in $\text{Na}_{1/2}\text{Bi}_{1/2}\text{TiO}_3$, *Phys. Rev. B* 86, 134103, 2012.

Rietveld, H. M., A profile refinement method for nuclear and magnetic structures, *J. Appl. Cryst.* 2, 65-71, 1969.

Rietveld, H. M., Line profiles of neutron powder-diffraction peaks for structure refinement, *Acta Cryst.* 22, 151, 1967.

Royles, A. J., Bell, A. J., Jephcoat, A. P., Kleppe, A. K., Milne, S. J. and Comyn, T. P., Electric-field-induced phase switching in the lead free piezoelectric potassium sodium bismuth titanate, *Appl. Phys. Lett.* 97, 132909, 2010.

Run, A. M. J. G., Terrell, D. R. and Scholing, J. H., An *in situ* grown eutectic magnetoelectric composite material, *J. Mater. Sci.* 9, 1710, 1974.

Satyamurthy, N. S., Natera, M. G., Youssef, S. I. and Begum, R. J., Yafet-Kittel angles in zinc-nickel ferrites, *Phys. Rev.*, 181, 969-77, 1969.

Schonau, K. A., Knapp, M., Kunzl, H., Hoffmann, M. J. and Fuess, H., In situ synchrotron diffraction investigation of morphotropic $\text{Pb}[\text{Zr}_{1-x}\text{Ti}_x]\text{O}_3$ under an applied electric field, *Phys. Rev. B* 76, 144112, 2007.

Schonau, K. A., Knapp, M., Kunzl, H., Hoffmann, M. J. and Fuess, H., Temperature dependent stability field of nanodomain structures in PZT ceramics using synchrotron powder diffraction, *Acta Cryst. A* 63, 189, 2007.

Schonau, K. A., Schmitt, L. A., Knapp, M., Fuess, H., Eichel, R. A., Kunzl, H. and Hoffmann, M. J., Nanodomain structure of $\text{Pb}[\text{Zr}_{1-x}\text{Ti}_x]\text{O}_3$ at its morphotropic phase boundary: Investigations from local to average structure, *Phys. Rev. B* 74, 184117, 2007.

Sciau, P., Calvarin, G. and Ravez, J., X-ray diffraction study of $\text{BaTi}_{0.65}\text{Zr}_{0.35}\text{O}_3$ and $\text{Ba}_{0.92}\text{Ca}_{0.08}\text{Ti}_{0.75}\text{Zr}_{0.25}\text{O}_3$ compositions: Influence of electric field, *Solid State Commun.* 113, 77-82, 2000.

Seshadri, R. and Hill, N. A., Visualizing the Role of Bi 6s “Lone Pairs” in the Off-Center Distortion in Ferromagnetic BiMnO_3 , *Chem. Mater.* 13, 2892-2899, 2001.

Shannon, R. D. and Prewitt, C. T., Effective ionic radii in oxides and fluorides, *Acta Cryst. B* 25, 925, 1969.

Shanthi, M. and Lim, L. C., Electric-field- and stress-induced R-O phase transformation in [011]-poled $\text{Pb}(\text{Mg}_{1/3}\text{Nb}_{2/3})\text{O}_3$ -(28-32)% PbTiO_3 single crystals of [100]-length cut, *J. Appl. Phys.* 106, 114116, 2009.

Sharma, J., Pandey, R. and Singh, A. K., Synthesis and structural characterization of highly tetragonal $(1-x)\text{Bi}(\text{Zn}_{1/2}\text{Ti}_{1/2})\text{O}_3$ - $x\text{PbTiO}_3$ piezoceramics, *AIP Conf. Proc.* 1512, 92-93, 2013.

Sheik, A. D. and Mathe, V. L., Effect of the piezomagnetic NiFe_2O_4 phase on the piezoelectric $\text{Pb}(\text{Mg}_{1/3}\text{Nb}_{2/3})_{0.67}\text{Ti}_{0.33}\text{O}_3$ phase in magnetoelectric composites, *Smart Mater. Struct.* 18, 065014, 2009.

Shirane, G., Pepinsky, R. and Frazer, B. C., X-ray and neutron diffraction study of ferroelectric PbTiO_3 , *Acta Crystallogr.* 9, 131, 1956.

Simon, A., Ravez, J. and Maglione, M., The crossover from a ferroelectric to a relaxor state in lead-free solid solutions, *J. Phys.: Cond. Matter* 16, 963, 2004.

Singh, A. K. , Mishra, S. K., Ragini, Pandey, D. , Yoon, S., Baik, S. and Shin, N., Origin of high piezoelectric response of $\text{Pb}(\text{Zr}_x\text{Ti}_{1-x})\text{O}_3$ at the morphotropic phase boundary: Role of elastic instability, *Appl. Phys. Lett.* 92, 022910, 2008.

Singh, A. K. and Pandey, D. and Zaharko, O., Evolution of short-range to long-range monoclinic order of M_B type with decreasing temperature in $0.75[\text{Pb}(\text{Mg}_{1/3}\text{Nb}_{2/3})\text{O}_3]-0.25\text{PbTiO}_3$, *J. Appl. Phys.* 99, 076105, 2006.

Singh, A. K. and Pandey, D. and Zaharko, O., Powder neutron diffraction study of phase transitions in and a phase diagram of $(1-x)[\text{Pb}(\text{Mg}_{1/3}\text{Nb}_{2/3})\text{O}_3]-x\text{PbTiO}_3$, *Phys. Rev. B* 74, 24101, 2006.

Singh, A. K. and Pandey, D., Evidence for M_B and M_C phases in the morphotropic phase boundary region of $(1-x)[\text{Pb}(\text{Mg}_{1/3}\text{Nb}_{2/3})\text{O}_3]-x\text{PbTiO}_3$: A Rietveld study, *Phys. Rev. B* 67, 064102, 2003.

Singh, A. K. and Pandey, D., Structure and the location of the morphotropic phase boundary region in $(1-x)[\text{Pb}(\text{Mg}_{1/3}\text{Nb}_{2/3})\text{O}_3]-x\text{PbTiO}_3$, *J. Phys.: Cond. Matter* 13, L931, 2001.

Singh, A. K. and Singh, A. K., X-ray diffraction and dielectric studies across morphotropic phase boundary in $(1-x)[\text{Pb}(\text{Mg}_{0.5}\text{W}_{0.5})\text{O}_3]-x\text{PbTiO}_3$ ceramics, *J. Alloy. Compd.* 509, 5167, 2011.

Singh, A. K., Pandey, D., Yoon, S., Baik, S. and Shin, N., High-resolution synchrotron x-ray diffraction study of Zr-rich compositions of $\text{Pb}(\text{Zr}_x\text{Ti}_{1-x})\text{O}_3$ ($0.525 \leq x \leq 0.60$): Evidence for the absence of the rhombohedral phase *Appl. Phys. Lett.* 91, 192904, 2007.

Singh, A., Pandey, V., Kotnala, R. K., Pandey, D., Direct evidence for multiferroic magnetoelectric coupling in $0.9\text{BiFeO}_3-0.1\text{BaTiO}_3$, *Phys. Rev. Lett.* 101, 247602, 2008.

Singh, A., Patel, J. P. and Pandey, D., High temperature ferroic phase transitions and evidence of paraelectric cubic phase in the multiferroic $0.8\text{BiFeO}_3-0.2\text{BaTiO}_3$, *Appl. Phys. Lett.* 95, 142909, 2009.

Singh, A., Phase transition studies on the multiferroic $(1-x)\text{BiFeO}_3-x\text{BaTiO}_3$ solid solutions, *Ph. D. thesis*, IIT (BHU) 2012.

Singh, S. P., Pandey, D., Yoon, S., Baik, S. and Shin, N., Resolving the characteristics of morphotropic phase boundary in the $[\text{Pb}(\text{Fe}_{1/2}\text{Nb}_{1/2})\text{O}_3]-x\text{PbTiO}_3$ system: A combined dielectric and synchrotron x-ray diffraction study, *Appl. Phys. Lett.* 93, 182910, 2008.

Singh, S. P., Singh, A. K. and Pandey, D., Dielectric relaxation and phase transitions at cryogenic temperatures in $\text{Pb}(\text{Ni}_{1/3}\text{Nb}_{2/3})\text{O}_3$ - PbTiO_3 ceramics, *Phys. Rev. B* 76, 054102, 2007.

Singh, S. P., Singh, A. K., Pandey, D., Sharma, H. and Parkash, O., Crystallographic phases, phase transitions, and barrier layer formation in (1-x) $[\text{Pb}(\text{Fe}_{1/2}\text{Nb}_{1/2})\text{O}_3]$ -x PbTiO_3 , *J. Mater. Res.* 18, 2677, 2003.

Skinner, D. P., Newnham, R. E., and Cross, L. E., Flexible composite transducers, *Mater. Res. Bull.* 13, 599, 1978.

Smit, J. and Wijn, H. P. J., Les ferrites, *Bibliothèque technique philips, Dunod, Paris*, 1961.

Smolenskii, G. A. and Chupis, I. E., Problems in Solid State Physics, *MIR Publications, Moscow*, p. 81, 1984.

Smolenskii, G. A., Isupov, V. A., Agranovskay, V. A. and Popov, S. N., New ferroelectrics of complex composition, *Sov. Phys. Sol. Stat.* 2, 2584, 1961.

Smolensky, G. A., Ferroelectrics and related materials, Gordon and Breach, New York, 1981.

Spaldin, N. A. and Fiebig, M., The renaissance of magnetoelectric multiferroics, *Science* 391, 309, 2005.

Srinivasan, G., Rasmussen, E. T., Gallegos, J., Srinivasan, R., Bokhan, Y. I. and Laletin, V. M., Magnetoelectric bilayer and multilayer structures of magnetostrictive and piezoelectric oxides, *Phys. Rev. B*, 64, 214408, 2001.

Stephanovich, V. A., Glinchuk, M. D. and Randall, C. A., Enhanced ferroelectric phase-transition temperature in perovskite-based solid solutions, *Phys. Rev. B* 70, 134101, 2004.

Stephens, P. W., Phenomenological model of anisotropic peak broadening in powder diffraction, *J. Appl. Cryst.* 32, 281, 1999.

Stringer, C. J., Shrout, T. R., Choi, S. M. and Randall, C. A., Classification of transition temperature behavior in ferroelectric PbTiO_3 - $\text{Bi}(\text{Me}'\text{Me}'')\text{O}_3$ solid solutions, *J. Appl. Phys.* 99, 024106, 2006.

Suchomel, M. R. and Davies, P. K., Enhanced tetragonality in x PbTiO_3 -(1-x) $\text{Bi}(\text{Zn}_{1/2}\text{Ti}_{1/2})\text{O}_3$ and related solid solution systems, *Appl. Phys. Lett.* 86, 262905, 2005.

- Suchomel, M. R., Fogg, A. M., Allix, M., Niu, H., Claridge, J. B. and Rosseinsky, M. J., $\text{Bi}_2\text{ZnTiO}_6$: A lead-free closed-shell polar perovskite with a calculated ionic polarization of $150 \mu\text{C}/\text{cm}^2$, *Chem. Mater.*, 18, 4987-4989, 2006.
- Suchtelen, V. J., Product properties: A new application of composite materials, *Phillips. Res. Rep.* 27, 28, 1972.
- Suryanarayana, S. V., Magnetoelectric interaction phenomena in materials, *Bull. Mater. Sci.*, 17, 1259-1270, 1994.
- Suryanarayana, S. V., Sarah, P., Singh, R. S., Bhimasankaram, T. and Mulay, V. N., Proc. 5th Asia-Pacific physics conference, Kaula Lampur (Singapore: World scientific) 2, 738, 1992.
- Thongbai, P., Maensiri, S. and Yamwong, T., Effects of grain, grain boundary, and dc electric field on giant dielectric response in high purity CuO ceramics, *J. Appl. Phys.* 104 , 036107, 2008 .
- Thongbai, P., Tangwancharoen, S., Yamwong, T. and Maensiri, S., Dielectric relaxation and dielectric response mechanism in (Li, Ti)-doped NiO ceramics, *J. Phys.: Condens. Matter* 20, 395227, 2008.
- Toby, B. H., R factors in Rietveld analysis: How good is good enough? *Powd. Diffract.* 21, 67, 2006.
- Trinquier, G., and Hoffmann, J. R., Lead Monoxide: Electronic Structure and Bonding, *J. Phys. Chem.* 88, 6696, 1984.
- Tutuncu, G., Fan, L., Chen, J., Xing, X. and Jones, J. L., Extensive domain wall motion and deaging resistance in morphotropic $0.55\text{Bi}(\text{Ni}_{1/2}\text{Ti}_{1/2})\text{O}_3\text{-}0.45\text{PbTiO}_3$ polycrystalline ferroelectrics, *Appl. Phys. Lett.* 104, 132907, 2014.
- Uchino, K., Electrostrictive effect in antiferroelectrics, *Solid Stat. Phys.* 17, 371-380, 1982.
- Uchino, K., Ferroelectric devices, *Taylor and Francis*, 2000.
- Upadhyay, S., Kumar, D., Parkash, O., Effect of composition on dielectric and electrical properties of the $\text{Sr}_{1-x}\text{La}_x\text{Ti}_{1-x}\text{Co}_x\text{O}_3$ system, *Bull. Mater. Sci.* 19, 513, 1996.
- Valasek, J., Piezo-electric and allied phenomena in rochelle salt, *Phys. Rev.* 17, 475, 1921.
- Valenzuela, R., Magnetic ceramics, *Cambridge University Press*-2005.

- Vanderbilt, D. and Cohen M. H., Monoclinic and triclinic phases in higher-order Devonshire theory *Phys. Rev. B* 63, 094108 (2001).
- Viehland, D., Jang, S. J., Cross, L. E., and Wuttig, M., Deviation from Curie-Weiss behavior in relaxor ferroelectrics, *Phys. Rev. B* 46, 8003, 1992.
- Viehland, D., Li, J. F., Jang, S. J., Cross, L. E. and Wuttig, M., Dipolar-glass model for lead magnesium niobate, *Phys. Rev. B* 43, 8316, 1991.
- Viehland, D., Symmetry-adaptive ferroelectric mesostates in oriented $Pb(BI_{1/3}BII_{2/3})O_3-PbTiO_3$ crystals, *J. Appl. Phys.* 88, 4794, 2000.
- Vogel, H., The temperature dependence law of the viscosity of fluids, *Phys. Z.* 22, 645, 1921.
- Wang, Y., Hu, J., Lin, Y. and Nan, C. W., Multiferroic magnetoelectric composite nanostructures, *NPG Asia Mater.* 2, 61, 2010.
- Waston, G., W., Parker, S. C. and Kresse, G., *Ab initio* calculation of the origin of the distortion of α -PbO, *Phys. Rev. B* 59, 8481 (1999).
- Westphal, V., Kleemann, W., Glinchuk, M., D., Diffuse phase transitions and random-field-induced domain states of the “relaxor” ferroelectric $Pb(Mg_{1/3}Nb_{2/3})O_3$, *Phys. Rev. Lett.* 68, 847, 1992.
- Wu, G., Jhou, H., Qin, N. and Bao, D., Growth and Electrical Properties of 25% $Bi(Ni_{1/2}Ti_{1/2})O_3$ -75% $PbTiO_3$ Thin Films on Pt/TiO₂/SiO₂/Si Substrates Using Pulsed Laser Deposition Method, *J. Am. Ceram. Soc.* 94, 1675, 2011.
- Wu, J., Nan, C. W., Lin, Y. and Deng, Y., Giant dielectric permittivity observed in Li and Ti doped NiO, *Phys. Rev. Lett.* 89, 217601, 2002.
- Wyatt, O. H. and Hughes, D. D., Metals, Ceramics and Polymers, *Cambridge University Press*, 1974.
- Xiaoyong, W., Yujun, F. and Xi, Y., Dielectric relaxation behavior in barium stannate titanate ferroelectric ceramics with diffused phase transition, *Appl. Phys. Lett.* 83, 2031, 2003.
- Xie, Z., Peng, B., Meng, S., Zhou, Y. and Yue, Z., High-Energy-Storage Density Capacitors of $Bi(Ni_{1/2}Ti_{1/2})O_3-PbTiO_3$ Thin Films with Good Temperature Stability, *J. Am. Ceram. Soc.* 96, 2061, 2013.
- Yafet, Y. and Kittel, C., Antiferromagnetic arrangements in ferrites, *Phys. Rev.*, 87, 290, 1952.

- Yasuda, N., Ohwa, H. and Asano, S., Dielectric properties and phase transitions of Ba(Ti_{1-x}Sn_x)O₃ solid solution, *Jpn. J. Appl. Phys.* 35, 5099, 1996.
- Young, R. A., The Rietveld method, *Oxford University Press*, pp.1-38, 1993.
- Yu, Z., Ang, C., Furman, E. and Cross, L. E., Dielectric relaxation and strain behavior of 95.5%Pb(Zn_{1/3}Nb_{2/3})O₃-4.5%PbTiO₃ single crystals at cryogenic temperatures, *Appl. Physi. Lett.* 82, 790, 2003.
- Zhang, Q., Jiang, M. and Li, Z., Structural and dielectric properties of (1-x)Bi(Ni_{1/2}Ti_{1/2})O₃-xPbTiO₃ ceramics with the morphotropic phase boundary composition, *J. Electroceram.* 29, 179, 2012.
- Zhang, S., Stringer, C., Xia, R., Choi, S. M., Randall, C. A., and Shrout, T. R., Investigation of bismuth-based perovskite system (1-x)Bi(Ni_{2/3}Nb_{1/3})O₃-xPbTiO₃, *J. Appl. Phys.* 98, 034103, 2005.
- Zhang, X., Zhu, L., Dong, Y., Weng, W., Han, G., Ma, N. and Du P., Initial permeability of percolative PbTiO₃/NiFe₂O₄ composite ceramics by a sol-gel in situ process, *J. Mater. Chem.*, 20, 10856-10861, 2010.
- Zhao, W. and Zuo, R., Morphotropic phase boundary and electrical properties of lead-free (K_{0.5}Bi_{0.5})TiO₃-Bi(Ni_{0.5}Ti_{0.5})O₃ relaxor ferroelectric, *Ceram. Internat.* 39, 9121-9124, 2013.
- Zheng, H., Wang, J., Lofland, S. E., Ma, Z., Ardabili, L. M., Zhao, T., Riba, L. S., Shinde, S. R., Ogale, S. B., Bai, F., Viehland, D., Jia, Y., Schlom, D. G., Wuttig, M., Roytburd, A. and Ramesh, R., Multiferroic BaTiO₃-CoFe₂O₄ nanostructures, *Science* 303, 661, 2004.
- Zhu, J., Feng, S., Liu, Q., Zhang, J., Xu, H., Li, Y., Li, X., Liu, J., Huang, Q., Zhao, Y. and Jin, C., Temperature and pressure effects of multiferroic Bi₂NiTiO₆ compound, *J. Appl. Phys.* 113, 143514, 2013.
- Zuo, R., Fu, J., Yin, G. Z., Li, X. L. and Jiang, J. Z., Electric field induced phase instability in typical (Na,K)(Nb,Sb)O₃-LiTaO₃ ceramics near orthorhombic and tetragonal phase boundary, *Appl. Phys. Lett.* 101, 092906, 2012.