

# References

1. F. Reif, "Fundamentals of Statistical and thermal Physics," *McGraw-Hill, Boston*, 1965
2. R.K. Pathria, "Statistical Mechanics," *Butterworth-Heinemann, Oxford*, 2001
3. R.M. White, "Quantum Theory of Magnetism," *Springer, New York*, 1983
4. J. S. Gardner, M. JGingras and J. E. Greedan, "Magnetic pyrochlore oxides," *Reviews of Modern Physics*, 2010, vol. 82, no. 1, pp. 53.
5. J. Villain, "Insulating spin glasses," *Zeitschrift für Physik B Condensed Matter*, 1979, vol. 33, no. 1, pp.31-42.
6. J. N. Reimers, A. J. Berlinsky and A. C. Shi, "Mean-field approach to magnetic ordering in highly frustrated pyrochlores," *Physical Review B*, 1991, vol. 43, no. 1, pp. 865.
7. R. Moessner and J.T. Chalker, "Properties of a classical spin liquid: the Heisenberg pyrochlore antiferromagnet," *Physical review letters*, 1998, vol. 80, no. 13, pp. 2929
8. J. N. Reimers, "Absence of long-range order in a three-dimensional geometrically frustrated antiferromagnet," *Physical Review B*, 1992, vol.45, no. 13, pp. 7287
9. B. Canals and C. Lacroix, "Pyrochlore antiferromagnet: a three dimensional quantum spin liquid," *Physical Review Letters*, 1998, vol.80,no. 13, pp. 2933
10. M. J. Harris, S. T. Bramwell, D. F. McMorrow, T. H. Ziske and K. W. Godfrey, "Geometrical frustration in the ferromagnetic pyrochlore  $\text{Ho}_2\text{Ti}_2\text{O}_7$ ," *Physical Review Letters*, 1997, vol. 79, no. 13, pp. 2554
11. S. Rosenkranz, A. P. Ramirez, A. Hayashi, R. J. Cava, R. Siddharthan and B. S. Shastry, "Crystal-field interaction in the pyrochlore magnet  $\text{Ho}_2\text{Ti}_2\text{O}_7$ ," *Journal of Applied Physics*, 2000, vol.87, no.9, pp. 5914

12. S. T. Bramwell and M. J. Gingras, "Spin ice state in frustrated magnetic pyrochlore materials," *Science*, 2001, vol. 294, no. 5546, pp. 1495-1501.
13. L. Lundgren, P. Svedlindh, P. Nordblad, and O. Beckman, "Dynamics of the relaxation-time spectrum in a CuMn spin-glass," *Physical review letters*, 1983, vol. 51, no. 10, pp. 911
14. J. P. Bouchaud, V. Dupuis, J. Hammann and E. Vincent, "Separation of time and length scales in spin glasses: Temperature as a microscope," *Physical review B*, 2001, vol. 65, no. 2, pp. 024439
15. J. S. Gardner, G. Ehlers, S. T. Bramwell and B. D. Gaulin, "Spin dynamics in geometrically frustrated antiferromagnetic pyrochlores," *Journal of Physics: Condensed Matter*, 2004, vol. 16, no. 11, pp. S643.
16. J. N. Reimers, J. E. Greedan and M. Sato, "The crystal structure of the spin-glass pyrochlore,  $Y_2Mo_2O_7$ ," *Journal of Solid State Chemistry*, 1988, vol. 72, no. 2, pp. 390
17. G.R. Haripriya, H.S. Nair, R. Pradheesh, S. Rayaprol, V. Siruguri, D. Singh, R. Venkatesh, V. Ganesan, K. Sethupathi, and V. Sankaranarayanan, "Spin reorientation and disordered rare earth magnetism in  $Ho_2FeCoO_6$ ," *Journal of Physics: Condensed Matter*, 2017, vol. 29, no. 47, pp. 475804
18. N.S. Rogado, J. Li, A.W. Sleight, and M.A. Subramanian, "Magnetocapacitance and magnetoresistance near room temperature in a ferromagnetic semiconductor:  $La_2NiMnO_6$ ," *Advanced Materials*, 2005, vol. 17, no. 18, pp. 2225-2227.
19. J. Blasco, J. García, G. Subías, J. Stankiewicz, J.A. Rodríguez-Velamazán, C. Ritter, J.L. García-Muñoz, and F. Fauth, "Magnetoelectric and structural properties of  $Y_2CoMnO_6$ : The role of antisite defects," *Physical Review B*, 2016, vol. 93, no. 21, pp. 214401.

20. D. Choudhury, P. Mandal, R. Mathieu, A. Hazarika, S. Rajan, A. Sundaresan, U.V. Waghmare, R. Knut, O. Karis, P. Nordblad, and D. D. Sarma, "Near-room-temperature colossal magnetodielectricity and multiglass properties in partially disordered  $\text{La}_2\text{NiMnO}_6$ ," *Physical review letters*, 2012, vol. 108, no. 12, pp. 127201.
21. H.S. Nair, D. Swain, H. N., S. Adiga, C. Narayana, and S. Elizabeth, "Griffiths phase-like behavior and spin-phonon coupling in double perovskite  $\text{Tb}_2\text{NiMnO}_6$ ," *Journal of applied physics*, 2011, vol. 110, no. 12, pp. 123919
22. T. Chakraborty, H. S. Nair, H. Nhalil, K. R. Kumar, A. M. Strydom and S. Elizabeth, "Disordered ferromagnetism in  $\text{Ho}_2\text{NiMnO}_6$  double perovskite.," *Journal of Physics: Condensed Matter*, 2016, vol.29, no. 2, pp. 025804.
23. R. I. Dass and J. B. Goodenough, "Multiple magnetic phases of  $\text{La}_2\text{CoMnO}_{6-\delta}$  ( $0 < \delta < 0.05$ )," *Physical Review B*, 2003, vol. 67, no. 1, pp. 014401
24. M. G. Hernández, J. L. Martínez, M. J. M. Lope, M.T. Casais and J. A. Alonso, "Finding universal correlations between cationic disorder and low field magnetoresistance in FeMo double perovskite series," *Physical review letters*, 2001, vol. 86, no. 11, pp. 2443
25. A. S. Ogale, S. B. Ogale, R. Ramesh, and T. Venkatesan, "Octahedral cation site disorder effects on magnetization in double-perovskite  $\text{Sr}_2\text{FeMoO}_6$ : Monte Carlo simulation study," *Applied physics letters*, 1999, vol. 75, no. 4, pp. 537-539
26. G. Sharma, J. Saha, S. D. Kaushik, V. Siruguri, and S. Patnaik, "Magnetism driven ferroelectricity above liquid nitrogen temperature in  $\text{Y}_2\text{CoMnO}_6$ ," *Applied Physics Letters*, 2013, vol. 103, no. 1, pp. 012903

27. L. Shlyk, S. Strobel, B. Farmer, L. E. De Long and R. Niewa, "Coexistence of ferromagnetism and unconventional spin-glass freezing in the site-disordered kagome ferrite  $\text{SrSn}_2\text{Fe}_4\text{O}_{11}$ ," *Physical Review B*, 2018, vol. 97, no. 5, pp. 054426
28. A. K. Pramanik and A. Banerjee, "Griffiths phase and its evolution with Mn-site disorder in the half-doped manganite  $\text{Pr}_{0.5}\text{Sr}_{0.5}\text{Mn}_{1-y}\text{Ga}_y\text{O}_3$  ( $y = 0.0, 0.025, \text{ and } 0.05$ )," *Physical Review B*, 2010, vol. 81, no. 2, pp. 024431.
29. S. J. Blundell, "Properties of Perovskites and Other Oxides, by K. Alex Müller and Tom W. Kool," *Contemporary Physics*, 2012, vol. 53, no. 3, pp. 263–263
30. J. B. Goodenough, "Theory of the role of covalence in the perovskite-type manganites  $[\text{La}, \text{M}(\text{II})] \text{MnO}_3$ ," *Physical Review*, 1955, vol. 100, no. 2, pp. 564.
31. J. D. M. Champion, M. J. Harris, P. C. W. Holdsworth, A. S. Wills, G. Balakrishnan, S. T. Bramwell, E. C. Izmar, T. Fennell, J. S. Gardner, J. Lago, D. F. McMorrow, M. Orenda, A. Orendaova, D. McK. Paul, R. I. Smith, M. T. F. Telling, A. Wildes, "Er<sub>2</sub>Ti<sub>2</sub>O<sub>7</sub>: Evidence of quantum order by disorder in a frustrated antiferromagnet." *Physical Review B*, 2003, vol. 68, no. 2, pp. 020401.
32. A. Poole, A. S. Wills, E. Lelievre Berna, "Magnetic ordering in the XY pyrochlore antiferromagnet Er<sub>2</sub>Ti<sub>2</sub>O<sub>7</sub>: a spherical neutron polarimetry study," *Journal of Physics: Condensed Matter*, 2007, vol. 19, no. 45, pp. 452201
33. M. Orendacet, K. Tibenská, J. Strečka, J. Čisárová, V. Tkáč, A. Orendáčová, E. Čížmár, J. Prokleška, and V. Sechovský. "Cross-tunneling and phonon bottleneck effects in the relaxation phenomena of X Y pyrochlore antiferromagnet Er<sub>2</sub>Ti<sub>2</sub>O<sub>7</sub>," *Physical Review B*, 2016, vol. 93, no. 2, pp. 024410.

34. N. P. Raju, M. Dion, M. J. P. Gingras, T. E. Mason, and J. E. Greedan, "Transition to long-range magnetic order in the highly frustrated insulating pyrochloreantiferromagnet  $Gd_2Ti_2O_7$ ," *Physical Review B*, 1999, vol. 59, no. 22, pp. 14489
35. V. Bondah-Jagalu, S. T. Bramwell, "Magnetic susceptibility study of the heavy rare-earth stannatepyrochlores," *Canadian journal of physics*, 2001, vol. 79, no. 11-12, pp. 1381-1385
36. P. Bonville, J. A. Hodges, M. Ocio, J. P. Sanchez, P. Vulliet, S. Sosin, and D. Braithwaite. "Low temperature magnetic properties of geometrically frustrated  $Gd_2Sn_2O_7$  and  $Gd_2Ti_2O_7$ ," *Journal of Physics: Condensed Matter*, 2003, vol. 15, no. 45, pp. 7777
37. A. P. Ramirez, B. S. Shastry, A. Hayashi, J. J. Krajewski, D. A. Huse, and R. J. Cava, "Multiple Field-Induced Phase Transitions in the Geometrically Frustrated Dipolar Magnet:  $Gd_2Ti_2O_7$ ," *Physical review letters*, 2002, vol. 89, no. 6, pp. 067202
38. M. J. P. Gingras, B. C. den Hertog, M. Faucher, J. S. Gardner, S. R. Dunsiger, L. J. Chang, B. D. Gaulin, N. P. Raju, and J. E. Greedan, "Thermodynamic and single-ion properties of  $Tb^{3+}$  within the collective paramagnetic-spin liquid state of the frustrated pyrochloreantiferromagnet  $Tb_2Ti_2O_7$ ," *Physical Review B*, 2000, vol. 62, no. 10, pp. 6496
39. J. S. Gardner, A. Keren, G. Ehlers, C. Stock, E. Segal, J. M. Roper, B. Fak, M. B. Stone, P. R. Hammar, and D. H. Reich et al "Dynamic frustrated magnetism in  $Tb_2Ti_2O_7$  at 50 mK." *Physical Review B*, 2003, vol. 68, no. 18, pp. 180401.
40. Y.-J. Kao, M. Enjalran, A. Del Maestro, H. R. Molavian, and M. J.P. Gingras, "Understanding paramagnetic spin correlations in the spin-liquid pyrochlore  $Tb_2Ti_2O_7$ ," *Physical Review B*, 2003, vol. 68, no. 17, pp. 172407

41. P. Bonville, I. Mirebeau, A. Gukasov, S. Petit, and J. Robert, "Tetragonal distortion yielding a two-singlet spin liquid in pyrochlore  $Tb_2Ti_2O_7$ ," *Physical Review B*, 2011, vol. 84, no. 18, pp. 184409
42. S. Petit, P. Bonville, J. Robert, C. Decorse, and I. Mirebeau, "Spin liquid correlations, anisotropic exchange, and symmetry breaking in  $Tb_2Ti_2O_7$ ," *Physical Review B*, 2012, vol. 86, no. 17, pp. 174403
43. S. Onoda and Y. Tanaka, "Quantum melting of spin ice: emergent cooperative quadrupole and chirality," *Physical review letters*, 2010, vol. 105, no. 4, pp. 047201
44. S. Onoda and Y. Tanaka, "Quantum fluctuations in the effective pseudospin-1/2 model for magnetic pyrochlore oxides," *Physical Review B*, 2011, vol. 83, no. 9, pp. 094411
45. B. G. Ueland, G. C. Lau, R. J. Cava, J. R. O'Brien, and P. Schiffer, "Slow spin relaxation in a highly polarized cooperative paramagnet," *Physical review letters*, 2006, vol. 96, no. 2, pp. 027216
46. M. Mączka, M. L. Sanjuán, A. F. Fuentes, K. Hermanowicz, and J. Hanuza, "Temperature-dependent Raman study of the spin-liquid pyrochlore  $Tb_2Ti_2O_7$ ," *Physical Review B*, 2008, vol. 78, no. 13, pp. 134420
47. B. Santhosh Kumar, C. Venkateswaran, "First Observed Metal-like to Insulator Transition in the Vacant 3d Orbital Quantum-Spin Liquid  $Tb_2Ti_2O_7$ ," *The Journal of Physical Chemistry*, 2020, vol. C 124, no. 46, pp. 25175-25183.
48. S.T. Bramwell, M. N. Field, M. J. Harris, and I. P. Perkin, "Bulk magnetization of the heavy rare earth titanate pyrochlores—a series of model frustrated magnets," *Journal of Physics: Condensed Matter*, 2000, vol. 12, no. 4, pp. 483

49. J.A. Hodges, P. Bonville, A. Forget, M. Rams, K. Królas, and G. Dhahlenne, “The crystal field and exchange interactions in  $\text{Yb}_2\text{Ti}_2\text{O}_7$ ,” *Journal of Physics: Condensed Matter*, 2001, vol. 13, no. 41, pp. 9301
50. R. M. D’Ortenzio, H. A. Dabkowska, S. R. Dunsiger, B. D. Gaulin, M. J. P. Gingras, T. Goko, J. B. Kycia, L. Liu, T. Medina, T. J. Munsie and D. Pomaranski, “Unconventional magnetic ground state in  $\text{Yb}_2\text{Ti}_2\text{O}_7$ ,” *Physical Review B*, 2013, vol. 88, no. 13, pp. 134428
51. J. S. Gardner, G. Ehlers, N. Rosov, R. W. Erwin, and C. Petrovic, “Spin-spin correlations in  $\text{Yb}_2\text{Ti}_2\text{O}_7$ : a polarized neutron scattering study,” *Physical Review B*, 2004, vol. 70, no. 18, pp. 180404
52. L. J. Chang, S. Onoda, Y. Su, Y. J. Kao, K. D. Tsuei, Y. Yasui, K. Kakurai and M. R. Lees, “Higgs transition from a magnetic Coulomb liquid to a ferromagnet in  $\text{Yb}_2\text{Ti}_2\text{O}_7$ ,” *Nature communications*, 2012, vol. 3, no. 1, pp. 1-7
53. A. P. Ramirez, A. Hayashi, R. J. Cava, R. Siddharthan, B. S. Shastry, *Nature*, “Zero-point entropy in ‘spin ice’,” *Nature*, 1999, vol. 399, no. 6734, pp. 333-335
54. G. Ehlers, A. L. Cornelius, M. Orendac, M. Kajnakova, T. Fennell, S. T. Bramwell and J. S. Gardner, “Dynamical crossover in ‘hot’ spin ice” *Journal of Physics: Condensed Matter*, 2003, vol. 15, no. 2, pp. 15-19.
55. J. Snyder, J. S. Slusky, R. J. Cava, and P. Schiffer, “Dirty spin ice: The effect of dilution on spin freezing in  $\text{Dy}_2\text{Ti}_2\text{O}_7$ ,” *Physical Review B*, 2002, vol. 66, no. 6, pp. 064432.
56. J. Snyder, B.G. Ueland, J.S. Slusky, H. Karunadasa, R.J. Cava, Ari Mizel, P. Schiffer, “Quantum-Classical Reentrant Relaxation Crossover in  $\text{Dy}_2\text{Ti}_2\text{O}_7$  Spin Ice,” *Physical review letters*, 2003, vol. 91, no. 10, pp. 107201

57. L. D. C. Jaubert, P. C. Holdsworth, "Signature of magnetic monopole and Dirac string dynamics in spin ice," *Nature Physics*, 2009, vol. 5, no. 4, pp. 258-261
58. S. T. Bramwell, M. J. Harris, B. C. Den Hertog, M. J. P. Gingras, J. S. Gardner, D. F. McMorrow, A. R. Wildes et al., "Spin correlations in  $\text{Ho}_2\text{Ti}_2\text{O}_7$ : a dipolar spin ice system," *Physical Review Letters*, 2001, vol. 87, no. 4, pp. 047205
59. A. L. Cornelius and J. S. Gardner, "Short-range magnetic interactions in the spin-ice compound  $\text{Ho}_2\text{Ti}_2\text{O}_7$ ," *Physical Review B*, 2001, vol. 64, no. 6, pp. 060406
60. K. Matsuhira, Y. Hinatsu, K. Tenya and T. Sakakibara, "Low temperature magnetic properties of frustrated pyrochloreferromagnets  $\text{Ho}_2\text{Sn}_2\text{O}_7$  and  $\text{Ho}_2\text{Ti}_2\text{O}_7$ ," *Journal of Physics: Condensed Matter*, 2000, vol. 12, no. 40, pp. L649
61. G. Ehlers, A. L. Cornelius, T. Fennell, M. Koza, S. T. Bramwell, and J. S. Gardner, "Evidence for two distinct spin relaxation mechanisms in 'hot' spin ice  $\text{Ho}_2\text{Ti}_2\text{O}_7$ ," *Journal of Physics: Condensed Matter*, 2004, vol. 16, no. 11, pp. S635
62. C. den Hertog, M. J. P. Gingras, "Dipolar interactions and origin of spin ice in Ising pyrochlore magnets," *Physical review letters*, 2000, vol. 84, no. 15, pp. 3430
63. R. G. Melko, M. J. P. Gingras, "Monte Carlo studies of the dipolar spin ice model," *Journal of Physics: Condensed Matter*, 2004, vol. 16, no. 43, pp. R1277
64. C. Mauwset, A. M. Hallas, Gabriele Sala, Adam A. Aczel, P. M. Sarte, J. Gaudet, D. Ziat et al. "Dipolar-octupolar Ising antiferromagnetism in  $\text{Sm}_2\text{Ti}_2\text{O}_7$ : A moment fragmentation candidate." *Physical Review B*, 2018, vol. 98, no. 10, pp. 100401.
65. A. Nag (Chattopadhyay), P. Dasgupta, Y.M. Jana, D. Ghosh, "A study on crystal field effect and single ion anisotropy in pyrochlore europium titanate", *Journal of Alloys and Compounds*, 2004, vol. 384, no. 1, pp. 6-11.



66. P. Dasgupta, Y.M. Jana, A.N. Chattopadhyay, R. Higashinaka, Y. Maeno, D. Ghosh, “Low-temperature measurements of magnetic susceptibility and specific heat of  $\text{Eu}_2\text{Ti}_2\text{O}_7$ —An XY pyrochlore,” *Journal of Physics and Chemistry of Solids*, 2007, vol. 68, no. 3, pp. 347-354
67. A. Pal, A. Singh, A.K. Ghosh, S. Chatterjee, ,” High temperature spin-freezing transition in pyrochlore  $\text{Eu}_2\text{Ti}_2\text{O}_7$ : A new observation from ac-susceptibility”, *Journal of Magnetism and magnetic materials*,. 2018 vol. 462, no. 15, pp. 1-7.
68. G. R. Haripriya, C. M. N. Kumar, R. Pradheesh, L. M. Martinez, C. L. Saiz, S. R. Singamaneni, T. Chatterji, V. Sankaranarayanan, K. Sethupathi, B. Kiefer, H. S. Nair, “Contrasting the magnetism in  $\text{La}_{2-x}\text{Sr}_x\text{FeCoO}_6$  ( $x=0, 1, 2$ ) double perovskites: The role of electronic and cationic disorder,” *Physical Review B*, 2019, vol. 99, no. 18, pp. 184411
69. H. Labrim , A. Jabar , A. Belhaj , S. Ziti , L. Bahmad, L. Laânb , A. Benyousse, “”,Magnetic proprieties of  $\text{La}_2\text{FeCoO}_6$  double perovskite: Monte Carlo study”, *Journal of Alloys and Compounds*., 2015 vol. 641, no. 25, pp. 37-42.
70. A. Pal, S. Ghosh, A. G. Joshi, S. Kumar, S. Patil, P. K. Gupta, P. Singh, V. K. Gangwar, P. Prakash, R. K. Singh and E. F. Schwier, “Investigation of multi-mode spin–phonon coupling and local B-site disorder in  $\text{Pr}_2\text{CoFeO}_6$  by Raman spectroscopy and correlation with its electronic structure by XPS and XAS studies,” *Journal of Physics: Condensed Matter*, 2019, vol. 31, no. 27, p.275802.
71. A. Pal, P. Singh, V. K. Gangwar, S. Ghosh, P. Prakash, S. K. Saha, A. Das, M. Kumar, A. K. Ghosh , S. Chatterjee, “B-site disorder driven multiple-magnetic phases: Griffiths phase, re-entrant cluster glass, and exchange bias in  $\text{Pr}_2\text{CoFeO}_6$ ,” *Applied Physics Letters*, 2019, vol. 114, no. 25, p.252403.

72. R. Pradheesh, Harikrishnan S. Nair, C. M. N. Kumar, JagatLamsal, R. Nirmala,P. N. Santhosh, W. B. Yelon, S. K. Malik, V. Sankaranarayanan, K. Sethupathi, "Observation of spin glass state in weakly ferromagnetic  $\text{Sr}_2\text{FeCoO}_6$  double perovskite," *Journal of applied physics*,2012, vol. 111, no. 5, pp. 053905
73. R. Pradheesh, H. S. Nair, V. Sankaranarayanan, and K. Sethupathi, "Large magnetoresistance and Jahn-Teller effect in  $\text{Sr}_2\text{FeCoO}_6$ ," *The European Physical Journal*, 2012, vol. B 85, no. 8, pp. 260.
74. R. Pradheesh, H. S. Nair, V. Sankaranarayanan, and K. Sethupathi, "Exchange bias and memory effect in double perovskite  $\text{Sr}_2\text{FeCoO}_6$ ," *Applied Physics Letters*,2012, vol. 101, no. 14, pp. 142401.
75. R. C. Sahoo, Y. Takeuchi, A. Ohtomo, Z. Hossain, "Exchange bias and spin glass states driven by antisite disorder in the double perovskite compound  $\text{LaSrCoFeO}_6$ ," *Physical Review B*,2019, vol. 100, no. 21, pp. 214436.Sahoo
76. R Pradheesh, Harikrishnan S Nair, G R Haripriya, AnatoliySenyshyn,TapanChatterji, V Sankaranarayananand K Sethupathi, "Magnetic glass state and magnetoresistance in  $\text{SrLaFeCoO}_6$  double perovskite," *Journal of Physics: Condensed Matter*, 2017, vol. 29, no. 9, pp. 095801.
77. Khagesh Tanwar, Deepankar Sri Gyan, Shovit Bhattacharya, Satish Vitta, Akansha Dwivedi, and Tanmoy Maiti, ,” Enhancement of thermoelectric power factor by inducing octahedral ordering in  $\text{La}_{2-x}\text{Sr}_x\text{CoFeO}_6$  double perovskites,”*Physical Review B*, 2019, vol. 99, no. 17410, pp. 1-11.

78. Moumita Das, Prabhat Mandal, "Nonlinear magnetodielectric and magnetocaloric properties of double perovskite  $\text{Ho}_2\text{FeCoO}_6$ " *Physica B: Condense Matter*, 2019, vol. 571, pp.32–35.
79. J. Krishna Murthy and A. Venimadhav, "Reentrant cluster glass behavior in  $\text{La}_2\text{CoMnO}_6$  nanoparticles," *Journal of Applied Physics*, 2013, vol. 113, no. 16, pp. 163906.
80. J. Krishna Murthy and A. Venimadhav, "Magnetodielectric behavior in  $\text{La}_2\text{CoMnO}_6$  nanoparticles," *Journal of Applied Physics*, 2012, vol. 111, no. 2, pp. 024102.
81. M. Ullah, S. A. Khan, G. Murtaza, R. Khenata, N. Ullah and S. B. Omran, "Electronic, thermoelectric and magnetic properties of  $\text{La}_2\text{NiMnO}_6$  and  $\text{La}_2\text{CoMnO}_6$ ," *Journal of Magnetism and Magnetic Materials*, 2015, vol. 377, pp.197-203.
82. M. Bejaret, "Influence of A-site cation size-disorder on structural, magnetic and magnetocaloric properties of  $\text{La}_{0.7}\text{Ca}_{0.3-x}\text{K}_x\text{MnO}_3$  compounds," *Journal of Alloys and Compounds*, 2007, vol. 440, no. 1, pp. 36-42.
83. C. Meyer, V. Roddatis, P. Ksoll, B. Damaschke and V. Moshnyaga, "Structure, magnetism, and spin-phonon coupling in heteroepitaxial  $\text{La}_2\text{CoMnO}_6/\text{Al}_2\text{O}_3$  (0001) films," *Physical Review B*, 2018, vol. 98, no. 13, p.134433.
84. R. N. Mahato, K. Sethupathi, and V. Sankaranarayanan, "Colossal magnetoresistance in the double perovskite oxide  $\text{La}_2\text{CoMnO}_6$ ," *Journal of Applied Physics*, 2010, vol. 107, no. 9, p.09D714.
85. Y. Guo, L. Shi, S. Zhou, J. Zhao, C. Wang, W. Liu and S. Wei, "Tunable exchange bias effect in Sr-doped double perovskite  $\text{La}_2\text{NiMnO}_6$ ," *Journal of Physics D: Applied Physics*, 2013, vol. 46, no. 17, p.175302

- 86.** Y. Guo, L. Shi, S. Zhou, J. Zhao and W. Liu, "Near room-temperature magnetoresistance effect in double perovskite  $\text{La}_2\text{NiMnO}_6$ ," *Applied Physics Letters*, 2013, vol. 102, no. 22, p.222401.
- 87.** R. Takahashi, I. Ohkubo, K. Yamauchi, M. Kitamura, Y. Sakurai, M. Oshima, T. Oguchi, Y. Cho, and M. Lippmaa, "A-site-driven ferroelectricity in strained ferromagnetic  $\text{La}_2\text{NiMnO}_6$  thin films," *Physical Review B*, 2015, vol. 91, no. 13, pp. 134107.
- 88.** J. Krishna Murthy, K. Devi Chandrasekhar, H. C. Wu, H. D. Yang, Jiunn-Yuan Lin, and A. Venimadhav. "Metamagnetic behaviour and effect of field cooling on sharp magnetization jumps in multiferroic  $\text{Y}_2\text{CoMnO}_6$ ." *EPL (Europhysics Letters)*, 2014, vol. 108, no. 2, pp. 27013.
- 89.** H. S. Nair, R. Pradheesh, Y. Xiao, D. Cherian, S. Elizabeth, T. Hansen, T. Chatterji and T. Brückel, "Magnetization-steps in  $\text{Y}_2\text{CoMnO}_6$  double perovskite: The role of antisite disorder," *Journal of Applied Physics*, 2014, vol. 116, no. (12), pp.123907.
- 90.** H. S. Nair, Tapan Chatterji, and André M. Strydom, "Antisite disorder-induced exchange bias effect in multiferroic  $\text{Y}_2\text{CoMnO}_6$ ." *Applied Physics Letters*, vol. 106, no. 2, pp. 022407.
- 91.** G. Sharma, J. Saha, S. D. Kaushik, V. Siruguri, and S. Patnaik. "Magnetism driven ferroelectricity above liquid nitrogen temperature in  $\text{Y}_2\text{CoMnO}_6$ ." *Applied Physics Letters*, 2013, vol. 103, no. 1, pp. 012903
- 92.** J. Krishna Murthy and A. Venimadhav, "Multicaloric effect in multiferroic  $\text{Y}_2\text{CoMnO}_6$ ," *Journal of Physics D: Applied Physics*, 2014, vol. 47, no. 44, pp. 445002.

93. S. Kumar, G. Giovannetti, J. van den Brink and S. Picozzi, "Theoretical prediction of multiferroicity in double perovskite  $\text{Y}_2\text{NiMnO}_6$ ," *Physical Review B*, 2010, vol. 82, no. 13, p.134429.
94. R. B. M. Filho, A. Pedro Ayala and C. William de Araujo Paschoal, "Spin-phonon coupling in  $\text{Y}_2\text{NiMnO}_6$  double perovskite probed by Raman spectroscopy," *Applied Physics Letters*, 2013, vol. 102, no. 19, p.192902.
95. J. Su, Z. Z. Yang, X. M. Lu, J. T. Zhang, L. Gu, C. J. Lu, Q. C. Li, J-M. Liu, and J. S. Zhu. "Magnetism-driven ferroelectricity in double perovskite  $\text{Y}_2\text{NiMnO}_6$ ." *ACS applied materials & interfaces*, 2015, vol. 7, no. 24, pp. 13260-13265.
96. R. P. Maiti, S. Dutta, M. Mukherjee, M. K. Mitra, and Dipankar Chakravorty, "Magnetic and dielectric properties of sol-gel derived nanoparticles of double perovskite  $\text{Y}_2\text{NiMnO}_6$ ," *Journal of Applied Physics*, vol. 112, no. 4, pp. 044311.
97. W. Liu, L. Shi, S. Zhou, J. Zhao, Y. Li and Y. Guo, "Griffiths phase, spin-phonon coupling, and exchange bias effect in double perovskite  $\text{Pr}_2\text{CoMnO}_6$ ," *Journal of Applied Physics*, 2014, vol. 116, no. 19, p.193901.
98. M. P. Singh, K. D. Truong, S. Jandl, and P. Fournier. "Magnetic properties and phonon behavior of  $\text{Pr}_2\text{NiMnO}_6$  thin films." *Applied Physics Letters*, 2011, vol. 98, no. 16, pp. 162506.
99. K. D. Truong, M. P. Singh, S. Jandl, and P. Fournier. "Investigation of phonon behavior in  $\text{Pr}_2\text{NiMnO}_6$  by micro-Raman spectroscopy." *Journal of Physics: Condensed Matter*, 2011, vol. 23, no. 5, pp. 052202.

- 100.** C. Ganeshraj, R. Pradheesh, and P. N. Santhosh. "Structural, magnetic, transport and magnetocaloric properties of metamagnetic  $\text{DyMn}_{0.5}\text{Co}_{0.5}\text{O}_3$ ," *Journal of Applied Physics*, 2012, vol. 111, no. 7, pp. 07A914.
- 101.** L. Wang, W. Zhou, D. Wang, Q. Cao, Q. Xu and Y. Du, "Effect of metamagnetism on multiferroic property in double perovskite  $\text{Sm}_2\text{CoMnO}_6$ ," *Journal of Applied Physics*, 2015, vol. 117, no. 17, p.17D914.
- 102.** W. Z. Yang, X. Q. Liu, H. J. Zhao, Y. Q. Lin, and X. M. Chen. "Structure, magnetic, and dielectric characteristics of  $\text{Ln}_2\text{NiMnO}_6$  (Ln= Nd and Sm) ceramics," *Journal of Applied Physics*, vol. 112, no. 6, pp. 064104.
- 103.** P. NeenuLekshmi, G. R. Raji, M. Vasundhara, ManojRaama Varma, S. Savitha Pillai, and M. Valant. "Re-entrant spin glass behaviour and magneto-dielectric effect in insulating  $\text{Sm}_2\text{NiMnO}_6$  double perovskite," *Journal of Materials Chemistry*, 2013, vol. C 1, no. 40, pp. 6565-6574.
- 104.** X.L. Wang, J. Horvat, H. K. Liu, A. H. Li, and S. X. Dou. "Spin glass state in  $\text{Gd}_2\text{CoMnO}_6$  perovskite manganite." *Solid state communications*, 2001, vol. 118, no. 1, pp. 27-30.
- 105.** J. Y. Moon, M. K. Kim, Young Jai Choi, and N. Lee. "Giant anisotropic magnetocaloric effect in double-perovskite  $\text{Gd}_2\text{CoMnO}_6$  single crystals." *Scientific reports*, 2017, vol. 7, no. 1, pp. 1-10.
- 106.** J Krishna Murthy, K. Devi Chandrasekhar, SudiptaMahana, D. Topwal, and A. Venimadhav. "Giant magnetocaloric effect in  $\text{Gd}_2\text{NiMnO}_6$  and  $\text{Gd}_2\text{CoMnO}_6$  ferromagnetic insulators." *Journal of Physics D: Applied Physics*, 2015, vol. 48, no. 35, pp. 355001.

- 107.** J. Krishna Murthy , Adyam Venimadhav “4f-3d exchange coupling induced exchange bias and field induced Hopkinson peak effects in  $Gd_2CoMnO_6$ ”, *Journal of Alloys and Compounds* ,2017, vol. 719 pp. 341-346.,
- 108.** R. C. Sahoo, Sananda Das, and T. K. Nath. "Role of Gd spin ordering on magnetocaloric effect and ferromagnetism in Sr substituted  $Gd_2CoMnO_6$  double perovskite." *Journal of Applied Physics*, 2018, vol. 124, no. 10,pp. 103901,.
- 109.** R. X. Silva, H. Reichlova, X. Marti, D. A. B. Barbosa, M. W. Lufaso, B. S. Araujo, A. P. Ayala, and C. W. A. Paschoal. "Spin-phonon coupling in  $Gd(Co_{1/2}Mn_{1/2})O_3$  perovskite." *Journal of Applied Physics*, 2013, vol. 114, no. 19, pp. 194102.
- 110.** S. H. Oh, H. Y. Choi, J. Y. Moon, M. K. Kim, Y. Jo, N. Lee, and Y. J. Choi. "Nonlinear magnetodielectric effect in double-perovskite  $Gd_2NiMnO_6$ ," *Journal of Physics D: Applied Physics*, 2015, vol. 48, no. 44, pp. 445001.
- 111.** R. B. MacedoFilho, D. A. B. Barbosa, H. Reichlova, X. Marti, A. S. De Menezes, A. P. Ayala, and C. W. A. Paschoal. "Role of rare-earth ionic radii on the spin–phonon coupling in multiferroic ordered double perovskites." *Materials Research Express*, 2015, vol. 2, no. 7, pp. 075201.
- 112.** V A Khomchenko, I. O. Troyanchuk, A. P. Sazonov, V. V. Sikolenko, H. Szymczak, and R. Szymczak. "Metamagneticbehaviour in  $TbCo_{0.5}Mn_{0.5}O_{3.06}$  perovskite," *Journal of Physics: Condensed Matter*, 2006, vol. 18, no. 42,pp. 9541.
- 113.** T. Chatterjee, Bernhard Frick and Harikrishnan S Nair., “Magnetic ordering in double perovskites  $R_2CoMnO_6$  (R = Y , Tb) investigated by high resolution neutron spectroscopy “, *Journal of Physics: Condensed Matter*, 2012, vol. 24, no. 26, pp. 1-7.
- 114.** F. Bloch, "Nuclear induction." *Physical review*, 1946, vol. 70, no. 7-8,pp. 460.

115. R.M. White, "Quantum Theory of Magnetism," *Springer, New York*, 1983
116. H.B.G. Casimir and F.K. du Pré, "Note on the thermodynamic interpretation of paramagnetic relaxation phenomena." *Physica*, 1938, vol. 5, no. 6, pp. 507-511.
117. J.D. Jackson, "Classical Electrodynamics," *John Wiley & Sons, Inc., New York*, 1999
118. G. Arfken, "Mathematical Methods for Physicists," *Academic Press, San Diego*, 1995
119. K.W.H. Stevens, "The theory of paramagnetic relaxation." *Reports on Progress in Physics*, 1967, vol. 30, no. 1, pp. 189.
120. S. Blundell, "Magnetism in condensed matter," *Oxford master series in condensed matter physics*, Oxford University press Inc, New York , 2001
121. J. Knolle, G.-W. Chern, D. L. Kovrizhin, R. Moessner, and N. B. Perkins, "Raman scattering signatures of Kitaev spin liquids in  $A_2\text{IrO}_3$  iridates with  $A = \text{Na}$  or  $\text{Li}$ ." *Physical review letters*, 2014, vol. 113, no. 18, pp. 187201.
122. J. A. Mydosh, "Spin Glass: An Experimental Introduction," *Taylor and Francis, London*, 1993.
123. K. Binder and A. P. Young, "Spin glasses: Experimental facts, theoretical concepts, and open questions." *Reviews of Modern physics*, 1986, vol. 58, no. 4, pp. 801.
124. C. Djurberg, P. Svedlindh, P. Nordblad, M. F. Hansen, F. Bødker, and S. Mørup, "Dynamics of an interacting particle system: evidence of critical slowing down." *Physical review letters*, 1997, vol. 79, no. 25, pp. 5154.
125. A. Ito, H. Aruga, E. Torikai, M. Kikuchi, Y. Syono, and H. Takei, "Time-Dependent Phenomena in a Short-Range Ising Spin-Glass,  $\text{Fe}_{0.5}\text{Mn}_{0.5}\text{TiO}_3$ ." *Physical review letters*, 1986, vol. 57, no. 4, pp. 483.



- 126.** M. D. Mukadam, S. M. Yusuf, P. Sharma, S. K. Kulshreshtha, and G. K. Dey, "Dynamics of spin clusters in amorphous  $\text{Fe}_2\text{O}_3$ ," *Physical Review B*, 2005, vol. 72, no. 17, pp. 174408.
- 127.** D. Sherrington and S. Kirkpatrick, "SOLVABLE MODEL OF A SPIN-GLASS", *Physical review letters*, 1975, vol. 32, pp. 1792-1796.
- 128.** M. Gabay and G. Toulouse, "Coexistence of spin-glass and ferromagnetic orderings." *Physical Review Letters*, 1981, vol. 47, no. 3, pp. 201.
- 129.** I. Kawasaki, D. Nishikawa, H. Hidaka, T. Yanagisawa, K. Tenya, M. Yokoyama, H. Amitsuka, "Magnetic properties around quantum critical point of  $\text{CePt}_{1-x}\text{Rh}_x$ ," *Physica B*, 2009, vol. 404, pp. 2908
- 130.** W. H. Meiklejohn and C. P. Bean, "New magnetic anisotropy." *Physical Review*, 1957, vol. 105, no. 3, pp. 904.
- 131.** E. C. Stoner and E. P. Wohlfarth, "Interpretation of high coercivity in ferromagnetic materials." *Nature*, 1947, vol. 160, no. 4071, pp. 650-651.
- 132.** E. C. Stoner and E. P. Wohlfarth, "Philosophical Transactions of the Royal Society of London. Series A," *Mathematical and Physical Sciences*, 1948, vol. 240, pp. 599
- 133.** W. H. Meiklejohn and C. P. Bean, "New magnetic anisotropy." *Physical review*, 1956, vol. 102, no. 5, pp. 1413.
- 134.** M. Ali, P. Adie, C.H. Marrows, D. Greig, B.J. Hickey, and R.L. Stamps, "Exchange bias using a spin glass." *Nature Materials*, 2007, vol. 6, no. 1, pp. 70-75.
- 135.** Q. K. Ong, A. Wei, and X.M. Lin, "Exchange bias in  $\text{Fe}/\text{Fe}_3\text{O}_4$  core-shell magnetic nanoparticles mediated by frozen interfacial spins." *Physical Review B*, 2009, vol. 80, no. 13, pp. 134418

- 136.** B.M. Wang, Y. Liu, P. Ren, B. Xia, K.B. Ruan, J.B. Yi, J. Ding, X.G. Li, and L. Wang, "Large exchange bias after zero-field cooling from an unmagnetized state." *Physical review letters*, 2011, vol. 106, no. 7, pp. 077203.
- 137.** F. Tian, K. Cao, Y. Zhang, Y. Zeng, R. Zhang, T. Chang, C. Zhou, M. Xu, X. Song, and S. Yang, "Giant spontaneous exchange bias triggered by crossover of superspin glass in Sb-doped Ni<sub>50</sub>Mn<sub>38</sub>Ga<sub>12</sub>Heusler alloys," *Scientific reports*, 2016, vol. 6, no. July, pp. 1–8.
- 138.** R. Sahoo, D. Paladhi, P. Dasgupta, A. Poddar, R. Singh, A. Das, T. Nath, "Antisite-disorder driven large exchange bias effect in phase separated La<sub>1.5</sub>Ca<sub>0.5</sub>CoMnO<sub>6</sub> double perovskite." *Journal of Magnetism and Magnetic Materials*, 2017, vol. 428, pp. 86-91.
- 139.** M. Gruber, T. Miyamachi, V. Davesne, M. Bowen, S. Boukari, W. Wulfhekel, M. Alouani and E. Beaurepaire, "Spin crossover in Fe(phen)<sub>2</sub>(NCS)<sub>2</sub> complexes on metallic surfaces," *The Journal of Chemical Physics*, 2017, vol. 146, no. 9, p.092312.
- 140.** T. Kimura, T. Goto, H. Shintani, K. Ishizaka, T-H. Arima, and Y. Tokura. "Magnetic control of ferroelectric polarization." *Nature*, 2003, vol. 426, no. 6962, pp. 55-58.
- 141.** S. Ren and M. Wuttig, "Organic exciton multiferroics," *Advanced Materials*, 2012, vol. 24, no. 6, pp. 724-727
- 142.** S. Park, P. A. Sharma, J. S. Ahn, S. Guha, and Sang-Wook Cheong. "Electric polarization reversal and memory in a multiferroic material induced by magnetic fields." *Nature*, 2004, vol. 429, no. 6990, pp. 392-395.
- 143.** G. Srinivasan, "Magnetoelectric composites." *Annual Review of Materials Research*, 2010, vol. 40, pp. 153-178.

- 144.** W. F. Giauque, "A thermodynamic treatment of certain magnetic effects. a proposed method of producing temperatures considerably below 1° absolute," *Journal of the American Chemical Society*, 1927, vol. 49, no. 8, pp. 1864-1870.
- 145.** B. D. Culity, "Elements of X-ray diffraction", *Addison- Wesley*, MA, 1978.
- 146.** H.M. Rietveld, "A profile refinement method for nuclear and magnetic structures," *Journal of Applied Crystallography*, 1969, vol. 2, no. 2 pp. 65–71.
- 147.** J. Chadwick, "Possible Existence of a Neutron", *Nature*, 1932, vol.129, pp. 312.
- 148.** G. Shull, E. O. Wollan, G. A. Morton and W. L. Davidson, "Neutron Diffraction Studies of NaH and NaD", *Physical Review B*, 1948, vol. 73, pp. 830.
- 149.** V. F. Sears, "Neutron scattering lengths and cross sections, *Neutron News*, 1992 vol. 3, pp. 26-37.
- 150.** A.P. Ramirez, "Handbook of magnetic materials", *Amsterdam: Elsevier Science*, 2001, vol. 13, pp . 423.
- 151.** R. Moessner, "Magnets with strong geometric frustration", *Canadian Journal of Physics*, 2001, vol. 79, no. 11-12 ,pp. 1283-1294.
- 152.** H. T. Diep, "Frustrated Spin Systems", *World Scientific Publishing Co. Pte. Ltd.*" 2004.
- 153.** L. Balents, "Spin liquids in frustrated magnets", *Nature*, 2010, vol. 464, no. 7286, pp. 199–208.
- 154.** C. Castelnovo, R. Moessner, S.L. Sondhi, "Magnetic monopoles in spin ice", *Nature*, 2008, vol. 451, pp. 42–45.
- 155.** T. Taniguchi, H. Kadowaki, H. Takatsu, B. Fåk, J. Ollivier, T. Yamazaki, T.J. Sato, H. Yoshizawa, Y. Shimura, T. Sakakibara, T. Hong, "Long-range order and spin-liquid

states of polycrystalline  $Tb_{2+x}Ti_{2-x}O_{7+y}$ ”, *Physical Review B*, 2013, vol. 87, no. 6, pp. 060408.-

- 156.** G. Ehlers, J.E. Greedan, J.R. Stewart, K.C. Rule, P. Fouquet, A.L. Cornelius, C. Adriano, G. Pagliuso, Y. Qiu, J.S. Gardner, “High-resolution neutron scattering study of  $Tb_2Mo_2O_7$  A geometrically frustrated spin glass”, *Physical Review B*, 2010, vol. 81, no. 22, pp. 224405.
- 157.** D.K. Singh, Y.S. Lee, “Nonconventional spin glass transition in a chemically ordered pyrochlore”, *Physical review letters*, 2012, vol. 109, no. 24, pp. 247201.
- 158.** S. Iguchi, Y. Kumano, K. Ueda, S. Kumakura, Y. Tokura, “Diffusive charge transport with strongly renormalized carrier mass in hole-doped Mott insulators  $(Y_{1-x}Cd_x)_2Mo_2O_7$  with frustrated pyrochlore lattice”, *Physical Review B*, 2011, vol. 84, no. 17, pp. 174416.
- 159.** J. Snyder, B.G. Ueland, J.S. Slusky, H. Karunadasa, R.J. Cava, P. Schiffer, “Low-temperature spin freezing in the  $Dy_2Ti_2O_7$  spin ice”, *Physical Review B*, 2004, vol. 69, no. 6, pp. 064414.
- 160.** J. Snyder, J.S. Slusky, R.J. Cava, P. Schiffer, “How ‘spin ice’ freezes”, *Nature*, 2001, vol. 413, no. 6851, pp. 48-51.
- 161.** J. Oitmaa, R.R.P. Singh, B. Javanparast, A.G.R. Day, B.V. Bagheri, M.J.P. Gingras, “Phase transition and thermal order-by-disorder in the pyrochloreantiferromagnet  $Er_2Ti_2O_7$  :A high-temperature series expansion study”, *Physical Review B*, 2013, vol. 88, no. 22 pp. 220404.
- 162.** B. H. Kim, G. Khaliullin, B. I. Min, “Magnetic Couplings, Optical Spectra, and Spin-Orbit Exciton in 5d Electron Mott Insulator  $Sr_2IrO_4$ ”, *Physical Review Letters*, 2012, vol. 109, no. 16, pp. 167205.

- 163.** H.W.J. Blote, R.F. Weilinga, W.J. Huiskamp, “Heat-capacity measurements on rare-earth double oxides  $R_2M_2O_7$ ”, *Physica*, 1969, vol. 43, no. 4, pp. 549-568.
- 164.** G., Ferey, R. De Pape, M. Leblanc, and J. Pannetier, “Ordered magnetic frustration. VIII: Crystal and magnetic structures of the pyrochlore form of  $FeF_3$  between 2.5 and 25 K from powder neutron diffraction. Comparison with the order varieties of  $FeF_3$ ”, *Revue de Chimie minérale*, 1986, vol. 23, no. 4-5, pp. 474-484.
- 165.** S. E. Palmer, and J. T. Chalker. “Order induced by dipolar interactions in a geometrically frustrated antiferromagnet”, *Physical Review B*, 2000, vol. 62, no. 1, pp. 488.
- 166.** S.T. Bramwell, ISIS Experimental Report, Rutherford Appleton Laboratory. ISIS99 Report No. 10 394, 1999,.
- 167.** W. Schiessl, W. Potzel, H. Karzel, M. Steiner, G. M. Kalvius, A. Martin, M. K. Krause et al. “Magnetic properties of the  $ZnFe_2O_4$  spinel”, *Physical Review B*, 1996, vol. 53, no. 14, pp. 9143.
- 168.** S-H. Lee, C. Broholm, T. H. Kim, I. I. W Ratcliff, and Sang-Wook Cheong, “Local spin resonance and spin-Peierls-like phase transition in a geometrically frustrated antiferromagnet”, *Physical Review Letters*, 2000, vol. 84, no. 16, pp. 3718.
- 169.** S. R. Dunsiger, R. F. Kiefl, K. H. Chow, B. D. Gaulin, M. J. P. Gingras, J. E. Greedan, A. Keren et al., “Muon spin relaxation investigation of the spin dynamics of geometrically frustrated antiferromagnets  $Y_2Mo_2O_7$  and  $Tb_2Mo_2O_7$ ”, *Physical Review B*, 1996, vol. 54, no. 13, pp. 9019.

- 170.** M. J. P. Gingras, C. V. Stager, N. P. Raju, B. D. Gaulin, and J. E. Greedan, “Static critical behavior of the spin-freezing transition in the geometrically frustrated pyrochlore antiferromagnet  $Y_2Mo_2O_7$ ”, *Physical review letters*, 1997, vol. 78, no. 5, pp. 947.
- 171.** J. S. Gardner, B. D. Gaulin, S-H. Lee, C. Broholm, N. P. Raju, and J. E. Greedan. “Glassy statics and dynamics in the chemically ordered pyrochlore antiferromagnet  $Y_2Mo_2O_7$ ”, *Physical review letters*, 1999, vol. 83, no. 1, pp. 211.
- 172.** B. D. Gaulin, J. N. Reimers, T. E. Mason, J. E. Greedan, and Z. Tun, “Spin freezing in the geometrically frustrated pyrochlore antiferromagnet  $Tb_2Mo_2O_7$ ”, *Physical review letters*, 1992, vol. 69, no. 22, pp. 3244.
- 173.** J. N. Reimers, J. E. Greedan, R. K. Kremer, E. Gmelin, and M. A. Subramanian, “Short-range magnetic ordering in the highly frustrated pyrochlore  $Y_2Mn_2O_7$ ”, *Physical Review B*, 1991, vol. 43, no. 4, pp. 3387.
- 174.** M. J. Harris, M. P. Zinkin, Z. Tun, B. M. Wanklyn, and I. P. Swainson, “Magnetic structure of the spin-liquid state in a frustrated pyrochlore”, *Physical review letters*, 1994, vol. 73, no. 1, pp. 189.
- 175.** S-W. Han, Jason S. Gardner, and Corwin H. Booth, “Structural properties of the geometrically frustrated pyrochlore  $Tb_2Ti_2O_7$ ”, *Physical Review B*, 2004, vol. 69, no. 2, pp. 024416.
- 176.** M. Ruminy, Laura Bovo, E. Pomjakushina, M. K. Haas, UweStuhr, Antonio Cervellino, Robert Joseph Cava, Michel Kenzelmann, and Tom Fennell, “Sample independence of magnetoelastic excitations in the rare-earth pyrochlore  $Tb_2Ti_2O_7$ ”, *Physical Review B*, 2016, vol. 93, no. 14, pp. 144407.

- 177.** J. S. Gardner, S. R. Dunsiger, B. D. Gaulin, M. J. P. Gingras, J. E. Greedan, R. F. Kiefl, M. D. Lumsden et al., “Cooperative paramagnetism in the geometrically frustrated pyrochlore antiferromagnet  $Tb_2Ti_2O_7$ ”, *Physical review letters*, 1999, vol. 82, no. 5, pp. 1012.
- 178.** J. S. Gardner, B. D. Gaulin, A. J. Berlinsky, Philip Waldron, S. R. Dunsiger, N. P. Raju, and J. E. Greedan, “Neutron scattering studies of the cooperative paramagnet pyrochlore  $Tb_2Ti_2O_7$ ”, *Physical Review B*, 2001, vol. 64, no. 22, pp. 224416.
- 179.** G. Luo, S. T. Hess, and L. R. Corruccini “Low temperature magnetic properties of the geometrically frustrated pyrochlores  $Tb_2Ti_2O_7$ ,  $Gd_2Ti_2O_7$ , and  $Gd_2Sn_2O_7$ ”, *Physics Letters A*, 2001, vol. 291, no. 4-5, pp. 306-310.
- 180.** K. Fritsch, E. Kermarrec, Kathryn Aileen Ross, Yiming Qiu, J. R. D. Copley, D. Pomaranski, J. B. Kycia, H. A. Dabkowska, and B. D. Gaulin, “Temperature and magnetic field dependence of spin-ice correlations in the pyrochlore magnet  $Tb_2Ti_2O_7$ ”, *Physical Review B*, 2014, vol. 90, no. 1, pp. 014429.
- 181.** L. Yin, J. S. Xia, Y. Takano, N. S. Sullivan, QiuJu Li, and XueFeng Sun, “Low-temperature low-field phases of the pyrochlore quantum magnet  $Tb_2Ti_2O_7$ ”, *Physical review letters*, 2013, vol. 110, no. 13, pp. 137201.
- 182.** M. A. Subramanian, G. Aravamudan, and GV SubbaRao, “Oxide pyrochlores: a review”, *Progress in Solid State Chemistry*, 1983, vol. 15, no. 2, pp. 55-143.
- 183.** H. Yamamura, H. Nishino, K. Kakinuma, and K. Nomura, “Electrical conductivity anomaly around fluorite–pyrochlore phase boundary”, *Solid State Ionics*, 2003, vol. 158, no. 3-4, pp. 359-365.
- 184.** FULLPROF suite web [<http://www.ill.eu/sites/fullprof/>].

- 185.** S-H. Lee, C. Broholm, W. Ratcliff, G. Gasparovic, Q. Huang, T. H. Kim, and S-W. Cheong, “Emergent excitations in a geometrically frustrated magnet”, *Nature*, 2002, vol. 418, no. 6900, pp. 856-858.
- 186.** O. Tchernyshyov, R. Moessner, and S. L. Sondhi, “Spin-Peierls phases in pyrochlore antiferromagnets”, *Physical Review B*, 2002, vol. 66, no. 6, pp. 064403.
- 187.** O. Tchernyshyov, R. Moessner, and S. L. Sondhi “Order by distortion and string modes in pyrochlore antiferromagnets”, *Physical review letters*, 2002, vol. 88, no. 6, pp. 067203.
- 188.** O. Tchernyshyov, O. A. Starykh, R. Moessner, and A. G. Abanov, “Bond order from disorder in the planar pyrochlore magnet”, *Physical Review B*, 2003, vol. 68, no. 14 pp. 144422.
- 189.** M Glerup, O. F. Nielsen, and F. W. Poulsen, “The structural transformation from the pyrochlore structure,  $A_2B_2O_7$ , to the fluorite structure,  $AO_2$ , studied by Raman spectroscopy and defect chemistry modeling”, *Journal of Solid State Chemistry*, 2001, vol. 160, no. 1, pp. 25-32.
- 190.** S. Saha, S. Singh, B. Dkhil, S. Dhar, R. Suryanarayanan, G. Dhalenne, A. Revcolevschi, and A. K. Sood, “Temperature-dependent Raman and x-ray studies of the spin-ice pyrochlore  $Dy_2Ti_2O_7$  and nonmagnetic pyrochlore  $Lu_2Ti_2O_7$ ”, *Physical Review B*, 2008, vol. 78, no. 21, pp. 214102.
- 191.** M. Maćzka, M. L. Sanjuán, A. F. Fuentes, L. Macalik, J. Hanuza, K. Matsuhira, and Z. Hiroi, “Temperature-dependent studies of the geometrically frustrated pyrochlores  $Ho_2Ti_2O_7$  and  $Dy_2Ti_2O_7$ ”, *Physical Review B*, 2009, vol. 79, no. 21, pp. 214437.



- 192.** B. V. Kumar, R. Velchuri, V. Rama Devi, B. Sreedhar, G. Prasad, D. Jaya Prakash, M. Kanagaraj, S. Arumugam, and M. Vithal, "Preparation, characterization, magnetic susceptibility (Eu, Gd and Sm) and XPS studies of  $\text{Ln}_2\text{ZrTiO}_7$  (Ln= La, Eu, Dy and Gd)", *Journal of Solid State Chemistry*, 2011, vol. 184, no. 2, pp. 264-272.
- 193.** H.B.G. Casimir, "On Onsager's principle of microscopic reversibility", *Reviews of Modern Physics*, 1945, vol. 17, no. 2-3, pp. 343.
- 194.** H. Xing, M. He, C. Feng, H. Guo, H. Zeng, and Z. Xu, "Emergent order in the spin-frustrated system  $\text{Dy}_x\text{Tb}_{2-x}\text{Ti}_2\text{O}_7$  studied by ac susceptibility measurements", *Physical Review B*, 2010, vol. 81, no. 13, pp. 134426.
- 195.** A.P. Ramirez, "Strongly geometrically frustrated magnets", *Annual Review of Materials Science*, 1994, vol. 24, no. 1, pp. 453-480.
- 196.** P. Schiffer and A.P. Ramirez. "Recent experimental progress in the study of geometrical magnetic frustration", *Comments on Condensed Matter Physics*, 1996, vol. 18, no. 1, pp. 21-50.
- 197.** H.T. Diep, "Magnetic systems with competing interactions: frustrated spin systems," 1994, *World Scientific*.
- 198.** L.J. Chang, M.R. Lees, I. Watanabe, A.D. Hillier, Y. Yasui, and S. Onoda, "Static magnetic moments revealed by muon spin relaxation and thermodynamic measurements in the quantum spin ice  $\text{Yb}_2\text{Ti}_2\text{O}_7$ ", *Physical Review B*, 2014, vol. 89, no. 18, pp. 184416.
- 199.** J.G. Rau, and M.J. Gingras, "Spin slush in an extended spin ice model," *Nature communications*, 2016, v. 7 n. 1, pp. 1-7.
- 200.** M.A. De Vries, J.R. Stewart, P.P. Deen, J.O. Piatek, G.J. Nilsen, H.M. Rønnow, and A. Harrison, "Scale-free antiferromagnetic fluctuations in the  $s=1/2$  kagome

- antiferromagnet herbertsmithite,” *Physical review letters*, 2009, vol. 103, no. 23, p.237201.
- 201.** T.H.Han, J.S. Helton, S.Chu, D.G. Nocera, J.A. Rodriguez-Rivera, C. Broholm, and Y.S. Lee, “Fractionalized excitations in the spin-liquid state of a kagome-lattice antiferromagnet,” *Nature*, 2012 vol. 492, no. 7429, pp. 406-410.
- 202.** J.S.Gardner, B.D. Gaulin, S.H. Lee, C. Broholm, N.P. Raju, and J.E. Greedan, “Glassy statics and dynamics in the chemically ordered pyrochlore antiferromagnet  $Y_2Mo_2O_7$ ,” *Physical review letters*, 1999, vol. 83, no. 1, pp. 211.
- 203.** J. E.Greedan, D. Gout, A.D. Lozano-Gorrin, S.Derakhshan, T. Proffen, H.J. Kim, Božin, and S.J.L.Billinge, “Local and average structures of the spin-glass pyrochlore  $Y_2Mo_2O_7$  from neutron diffraction and neutron pair distribution function analysis,” *Physical Review B*, 2009, vol. 79, no. 1, pp. 014427.
- 204.** K.A. Ross, Y. Qiu, J.R.D. Copley, H.A. Dabkowska, and B.D. Gaulin, “Order by Disorder Spin Wave Gap in the X Y Pyrochlore Magnet  $Er_2Ti_2O_7$ ,” *Physical review letters*, 2014 vol. 112, no.5, pp.057201.
- 205.** S. Petit, J. Robert, S. Guitteny, P. Bonville, C. Decorse, J. Ollivier, H. Mutka, M.J.Gingras, and I.Mirebeau, “Order by disorder or energetic selection of the ground state in the X Y pyrochlore antiferromagnet  $Er_2Ti_2O_7$ ,” An inelastic neutron scattering study,” *Physical Review B*, 2014, vol. 90, no. 6, pp. 060410.
- 206.** M.J. Harris, S.T. Bramwell, P.C.W. Holdsworth, and J.D.M.Champion, “Liquid-gas critical behavior in a frustrated pyrochlore ferromagnet”,” *Physical review letters*, 1998, vol. 81 no. 20, pp.4496.

- 207.** S.T. Bramwell, and M.J. Harris, “Frustration in Ising-type spin models on the pyrochlore lattice,” *Journal of Physics: Condensed Matter*, 1998, vol. 10, no. 14, pp.L215.
- 208.** K. Matsuhira, Y. Hinatsu, and T. Sakakibara, “Novel dynamical magnetic properties in the spin ice compound  $\text{Dy}_2\text{Ti}_2\text{O}_7$ ,” *Journal of Physics: Condensed Matter*, 2001, vol. 13, no. 31, pp.L737.
- 209.** K. Matsuhira, Y. Hinatsu, K. Tenya, and T.Sakakibara, “Low temperature magnetic properties of frustrated pyrochlore ferromagnets  $\text{Ho}_2\text{Sn}_2\text{O}_7$  and  $\text{Ho}_2\text{Ti}_2\text{O}_7$ ,” *Journal of Physics: Condensed Matter*, 2000, vol. 12, no. 40, pp. L649.
- 210.** H. Fukazawa, R.G.Melko, R. Higashinaka, Y. Maeno, and M.J.P. Gingras, “Magnetic anisotropy of the spin-ice compound  $\text{Dy}_2\text{Ti}_2\text{O}_7$ ,” *Physical Review B*, 2002, vol. 65, no. 5, pp. 054410.
- 211.** X. Ke, M.L. Dahlberg, E.Morosan, J.A. Fleitman, R.J. Cava, and P. Schiffer, “Magneto thermodynamics of the Ising antiferromagnet  $\text{Dy}_2\text{Ge}_2\text{O}_7$ ,” *Physical Review B*, 2008, vol. 78, no. 10, pp. 104411.
- 212.** H.D. Zhou, S.T. Bramwell, J.G. Cheng, C.R. Wiebe, G. Li, L.Balicas, J.A. Bloxson, H.J. Silverstein, J.S. Zhou, J.B. Goodenough, and J.S. Gardner, “High pressure route to generate magnetic monopole dimers in spin ice”. *Nature communications*, 2011, vol. 2, no. 1, pp. 1-5.
- 213.** R.G. Melko, B.C. den Hertog, and M.J.Gingras, “Long-range order at low temperatures in dipolar spin ice,” *Physical review letters*, 2001, vol. 87, no. 6, pp. 067203.

- 214.** T. Fennell, P.P. Deen, A.R. Wildes, K. Schmalzl, D. Prabhakaran, A.T. Boothroyd, R.J. Aldus, D.F. McMorrow, and S.T. Bramwell, “Magnetic Coulomb phase in the spin ice  $\text{Ho}_2\text{Ti}_2\text{O}_7$ ,” *Science*, 2009, vol. 326, no. 5951, pp.415-417.
- 215.** S.T. Bramwell, S.R. Giblin, S. Calder, R. Aldus, D. Prabhakaran, and T. Fennell, “Measurement of the charge and current of magnetic monopoles in spin ice,” *Nature*, 2009, vol. 461, no. 7266, pp. 956-959.
- 216.** H. Kadowaki, N. Doi, Y. Aoki, Y. Tabata, T.J. Sato, J.W. Lynn, K. Matsuhira, and Z. Hiroi, “Observation of magnetic monopoles in spin ice”. *Journal of the Physical Society of Japan*, 2009, vol. 78, no. 10, pp. 103706-103706.
- 217.** X. Ke, R.S. Freitas, B.G. Ueland, G.C. Lau, M.L. Dahlberg, R.J. Cava, R. Moessner, and P. Schiffer, “Nonmonotonic zero-point entropy in diluted spin ice”. *Physical review letters*, 2007, vol. 99 no. 13, pp. 137203.
- 218.** J. Snyder, B.G. Ueland, A. Mizel, J.S. Slusky, H. Karunadasa, R.J. Cava, and P. Schiffer, “Quantum and thermal spin relaxation in the diluted spin ice  $\text{Dy}_{2-x}\text{M}_x\text{Ti}_2\text{O}_7$  (M= Lu, Y),” *Physical Review B*, 2004, vol. 70, no. 18, pp.184431.
- 219.** A.K. Pandit, T.H., Ansari, R.A. Singh, and B.M., Wanklyn, “Electrical conduction in  $\text{Dy}_2\text{Ti}_2\text{O}_7$  single crystal”. *Materials Letters*, 1991, vol. 11, no.1-2, pp. 52-58.
- 220.** N. Zhang, H. Wang, Y.D. Li, Q.J. Li, S.G. Huang, Y. Yu, J. Zheng, C. Cheng, and C.C. Wang, “Incipient ferroelectricity and conductivity relaxations in  $\text{Dy}_2\text{Ti}_2\text{O}_7$ ,” *Journal of Alloys and Compounds*, 2016, vol. 683, pp. 387-392.
- 221.** M. Saito, R. Higashinaka, and Y. Maeno, “Magnetodielectric response of the spin-ice  $\text{Dy}_2\text{Ti}_2\text{O}_7$ ,” *Physical Review B*, 2005, vol. 72, no.14, pp. 144422.

- 222.** H. Liu, Y. Zou, L. Ling, L. Zhang, C. Zhang, and Y. Zhang, “Enhanced ferromagnetism and emergence of spin-glass-like transition in pyrochlore compound  $\text{Dy}_2\text{Ti}_{2-x}\text{V}_x\text{O}_7$ ,” *Journal of Magnetism and Magnetic Materials*, 2015, vol. 388, pp. 135-142.
- 223.** H. Liu, Y. Zou, L. Ling, L. Zhang, W. Tong, C. Zhang, and Y. Zhang, “Frustrated magnetism and dynamical properties in pyrochlore-type magnet  $\text{Dy}_2\text{Ti}_{2-x}\text{Fe}_x\text{O}_7$ ,” *Journal of magnetism and magnetic materials*, 2014, vol. 369, pp. 107-113.
- 224.** P.Singh, A. Pal, V.K. Gangwar, S. Ghosh, R.K. Singh, A.K. Ghosh, and, S. Chatterjee, “Spin freezing and field induced transition in  $(\text{Tb}_{1-x}\text{Eu}_x)_2\text{Ti}_2\text{O}_7$ : A magnetic property study,” *Journal of Magnetism and Magnetic Materials*, 2019, vol. 490, pp.165512.
- 225.** V.K. Anand, D.A. Tennant, and B. Lake, “Investigations of the effect of nonmagnetic Ca substitution for magnetic Dy on spin-freezing in  $\text{Dy}_2\text{Ti}_2\text{O}_7$ ,” *Journal of Physics: Condensed Matter*, 2015, vol.27, no. 43, pp.436001.
- 226.** H.C. Gupta, J. Singh, S. Kumar, and N. Rani, “A lattice dynamical investigation of the Raman and the infrared frequencies of the  $\text{Dy}_2\text{Ti}_2\text{O}_7$  pyrochlore spin ice compound,” *Journal of Molecular Structure*, 2009 vol. 937, no. 1-3, pp. 136-138.
- 227.** A. F. Fuentes, K. Boulahya, M. Maczka, J. Hanuza and U. Amador, “Synthesis of disordered pyrochlores,  $\text{A}_2\text{Ti}_2\text{O}_7$  (A= Y, Gd and Dy), by mechanical milling of constituent oxides,” *Solid state sciences*, 2005, vol. 7, no. 4, pp. 343-353.
- 228.** L. J. Chang, W. Schweika, Y-J. Kao, Y. Z. Chou, J. Perßon, Th Brückel, Hong-Chang Yang, Y. Y. Chen, and J. S. Gardner. "Magnetic correlations in  $\text{Ho}_x\text{Tb}_{2-x}\text{Ti}_2\text{O}_7$ ," *Physical Review B*, 2011, vol. 83, no. 14, pp. 144413.

- 229.** L. H. Bennett and E. Della Torre, "Analysis of wasp-waist hysteresis loops," *Journal of applied physics*, 2005, vol. 97, no. 10, pp. 10E502.
- 230.** J. P. Palakkal, C. R. Sankar, A. P. Paulose and M. R.Varma, "Hopping conduction and spin glass behavior of La<sub>2</sub>FeMnO<sub>6</sub>," *Journal of Alloys and Compounds*, 2018, vol. 743, pp. 403-409.
- 231.** A.P. Roberts, Y. Cui, K.L. Verosub, "Wasp-waisted hysteresis loops: Mineral magnetic characteristics and discrimination of components in mixed magnetic systems." *Journal of Geophysical Research: Solid Earth*, 1995, vol. 100, no. B9, pp. 17909-17924.
- 232.** Y. Tian, S. Shen, J. Cong, L. Yan, S. Wang, Y. Sun, "Observation of resonant quantum magnetoelectric effect in a multiferroic metal–organic framework." *Journal of the American Chemical Society*, 2016, vol. 138, no. 3, pp. 782-785.
- 233.** L. Tauxe, T. A. T. Mullender and T. Pick, "Potbellies, wasp-waists, and superparamagnetism in magnetic hysteresis," *Journal of Geophysical Research: Solid Earth*, 1996, vol. 101, no. B1, pp. 571-583.
- 234.** L. Curecheriu, P. Postolache, M. T. Buscaglia, V. Buscaglia, A. Lanculescu, L. Mitoseriu. "Novel magnetoelectric ceramic composites by control of the interface reactions in Fe<sub>2</sub>O<sub>3</sub>@BaTiO<sub>3</sub> core-shell structures." *Journal of Applied Physics*, 2014, vol. 116, no. 8, pp. 084102.
- 235.** R. S. Kharwanlang, P. Shukla, "Analysis of wasp-waisted hysteresis loops in magnetic rocks." *Physical Review*, 2012, vol. E 85, no. 1, pp. 011124.
- 236.** J. R. Andrez, E. C. Passamani, A. Y. Takeuchi, C. Larica, and A. Biondo. "Wasp waisted-like hysteresis loops observed in the  $\gamma$ -Fe<sub>2</sub>MnGa compound." *Journal of Alloys and Compounds*, 2017, vol. 701, pp. 366-371.

- 237.** Tiberio Magno de Lima Alves, Bruno Ferreira Amorim, Marco Antonio Morales Torres, Claudionor Gomes Bezerra, Suzana N obrega de Medeiros, Pedro Lana Gastelois, Luis Eugenio Fernandez Outoncd , Waldemar Augusto de Almeida Macedoc, “Wasp-waisted behavior in magnetic hysteresis curves of  $\text{CoFe}_2\text{O}_4$  nanopowder at a low temperature: Experimental evidence and theoretical approach,” *RSC advances*, 2017, vol. 7, no. 36, pp. 22187-22196
- 238.** X. Li, F. Guo, S. Y. Wang, X. Wang, X. L. Xu, J. Gao, W. F. Liu, "Template-free synthesis of  $\text{Nd}_{0.1}\text{Bi}_{0.9}\text{FeO}_3$  nanotubes with large inner diameter and wasp-waisted hysteresis loop." *Applied Physics Letters*, 2015, vol. 107, no. 6, pp. 062903
- 239.** S.Chikazumi, 2nd ed. *Oxford University Press, Oxford*, 1997, pp. 503–508.
- 240.** N. Ranvah, Y. Melikhov, D. C. Jiles, J. E. Snyder, A. J. Moses, P. I. Williams, S. H. Song, “Temperature dependence of magnetic anisotropy of Ga-substituted cobalt ferrite,” *Journal of Applied Physics*, 2008, vol. 103, no. 7, pp.07E506.
- 241.** G.C. Lau, R.S. Freitas, B.G. Ueland, B.D. Muegge, E.L. Duncan, P. Schiffer, R.J. Cava, "Zero-point entropy in stuffed spin-ice." *Nature Physics*, 2006, vol. 2, no. 4, pp. 249-253.
- 242.** B.G. Ueland, G.C. Lau, R.S. Freitas, J. Snyder, M. L. Dahlberg, B. D. Muegge, E. L. Duncan, R. J. Cava, and P. Schiffer. "Magnetothermal study of a Dy-stuffed spin ice:  $\text{Dy}_2(\text{Dy}_x\text{Ti}_{2-x})\text{O}_{7-x/2}$ ." *Physical Review B*, 2008, vol. 77, no. 14, pp. 144412.
- 243.** K. Kimura, S. Nakatsuji, J.J. Wen, C. Broholm, M. B. Stone, E. Nishibori, H. Sawa, "Quantum fluctuations in spin-ice-like  $\text{Pr}_2\text{Zr}_2\text{O}_7$ ," *Nature communications*, 2013, vol. 4, no. 1, pp. 1-6.

- 244.** L Lin, Y L Xie, J-JWen, S Dong, Z B Yan, J-M Liu, "Experimental observation of magnetoelectricity in spin ice  $\text{Dy}_2\text{Ti}_2\text{O}_7$ ," *New Journal of Physics*, 2015, vol. 17, no. 12, pp.123018.
- 245.** Hui Liu, Youming Zou, Lei Zhang, Langsheng Ling, Hongyan Yu, Lei He, Changjin Zhangn, Yuheng Zhang, "Frustrated magnetism and dynamical properties in pyrochlore-type magnet  $\text{Dy}_2\text{Ti}_{2-x}\text{Fe}_x\text{O}_7$ ," *Journal of Magnetism and Magnetic Materials*,. 2014, Vol. 369, pp. 107-113.
- 246.** A. Pal, S. Ghosh, S. Kumar, E. F. Schwier, M. Sawada, K. Shimada, M. Gupta, D.M. Phase, A.K. Ghosh, S. Chatterjee, "Electronic structure by X-ray absorption spectroscopy and observation of field induced unusually slow spin relaxation from magnetic properties in pyrochlore  $\text{Eu}_{2-x}\text{Fe}_x\text{Ti}_2\text{O}_7$ ." *Journal of Magnetism and Magnetic Materials*, 2019, vol. 476, pp. 7-17.
- 247.** H. Liu, J. Bian, S. Chen, Y. Feng, Y. Xie, B. Fang, "Magnetic and dynamical properties in the diluted spin ice  $\text{Dy}_{2-x}\text{La}_x\text{Ti}_2\text{O}_7$ ," *Journal of Magnetism and Magnetic Materials*,2018, vol. 465, pp. 316-322.
- 248.** M Bibes, A Barthelemy, "Multiferroics: towards a magnetoelectric memory", *Nature Materials*,. 2008, vol. 7, no. 6, pp. 425-426.
- 249.** J F Scott, "Data Storage. Multiferroic Memories," *Nature Materials*", 2007, vol. 6, no. 4, pp. 256-257.
- 250.** J. Gao, L. Shen, Y. Wang, D. Gray, J. Li, D. Viehland, "Enhanced sensitivity to direct current magnetic field changes in Metglas/Pb( $\text{Mg}_{1/3}\text{Nb}_{2/3}$ ) $\text{O}_3$ -PbTiO $_3$  laminates" *Journal of Applied Physics*,., 2011, vol. 109, no. 074507, pp. 1-4.



- 251.** L. Y. Zhang, D. Zheng, M. Chaoyong, L. J. Yuanhua, C.W. Nan, “Demonstration of magnetoelectric read head of multiferroic heterostructures” *Applied Physics Letters*, 2008, vol. 92, no. 152510 pp. 1-4.
- 252.** F. S. Galasso, “Structure, Properties and Preparation of Perovskite-type Compounds”, 1969.
- 253.** E. Dagotto, “Complexity in Strongly Correlated Electronic Systems” *Science*, 2005, vol. 309 no. 5732, pp. 257-263.
- 254.** J. Varignon, N. C. Bristowe, E. Bousquet, P. Ghosez, “Coupling and electrical control of structural, orbital and magnetic orders in perovskites” *Scientific Reports*, 2015, vol. 5, no.15364.
- 255.** Jiyue Song, Bangchuan Zhao, Lihua Yin, Yanfeng Qin, Jiafeng Zhou, Dong Wang, Wenhai Songa, Yuping Suna, “Reentrant spin glass behavior and magnetodielectric coupling of an Ir-based double perovskite compound,  $\text{La}_2\text{CoIrO}_6$ ” *Dalton transactions*., 2017, vol. 46, pp. 11691-11697.
- 256.** Jasnamol P. Palakkal, Raj S. Cheriyaedath, P.N. Lekshmi, Matjaz Valant, Mojca V. Mihelj, Manoj R. Varma, “Large positive and negative magnetodielectric coupling in Fe half-doped  $\text{LaMnO}_3$ ”, *Journal of Magnetism and Magnetic Materials*, 2019, vol.474 , pp.183-186.
- 257.** G. Popov, M. Greenblatt, M. Croft, “ Large effects of A-site average cation size on the properties of the double perovskites  $\text{Ba}_{2-x}\text{Sr}_x\text{MnReO}_6$ : A  $d_5-d_1$  system”, *Physical Review B*, 2003, vol. 67, no. 024406 pp. 1-9.

- 258.** D V Karpinsky, I O Troyanchuk, K Barner, H Szymczak, “M Tovar, Crystal structure and magnetic ordering of the  $\text{LaCo}_{1-x}\text{Fe}_x\text{O}_3$  system,” *Journal of Physics: Condensed Matter*, 2005, vol. 17, no. 46 pp. 7219-7222.
- 259.** M W Haverkort, Z. Hu, J. C. Cezar, T. Burnus, H. Hartmann, M. Reuther, C. Zobel, T. Lorenz, A. Tanaka, N. B. Brookes, H. H. Hsieh, H.J. Lin, C. T. Chen, L. H. Tjeng, “Spin State Transition in  $\text{LaCoO}_3$  Studied Using Soft X-ray Absorption Spectroscopy and Magnetic Circular Dichroism” *Physical review letters*, 2006, vol. 97, no.176405 pp. 1-4.
- 260.** D H Kim, H J Lee, G Kim, Y S Koo, J H Jung, H J Shin, J Y Kim, J S Kang, “Interface electronic structures of  $\text{BaTiO}_3@X$  nanoparticles ( $X=\gamma\text{-Fe}_2\text{O}_3$ ,  $\text{Fe}_3\text{O}_4$ ,  $\alpha\text{-Fe}_2\text{O}_3$  and Fe) investigated by XAS and XMCD” *Physical Review B*, 2009, vol. 79, no.033402 , pp. 1-4.
- 261.** Krishnan M, “ Iron  $L_{3,2}$  near-edge fine structure studies” *Ultramicroscopy*, 1990, vol. 32, no. 309 pp. 252-257.
- 262.** R. F. Klie, J. C. Zheng, Y. Zhu, M. Varela, J. Wu, C. Leighton, “Direct Measurement of the Low-Temperature Spin-State Transition in  $\text{LaCoO}_3$ ”, *Physical review letter.*, 2007, vol. 99, no. 047203 pp. 1-4.
- 263.** Bismayan Chakrabarti, Turan Birol, Kristjan Haule, “Role of entropy and structural parameters in the spin-state transition of  $\text{LaCoO}_3$ ” *Phys. Rev. Mater.*, 2017, vol. 1, no. 064403 pp. 1-8.
- 264.** I. Dzyaloshinsky, “A thermodynamic theory of “weak” ferromagnetism of antiferromagnetics” *Journal of Physics and Chemistry of Solids*, 1958, vol. 4, no. 4, pp. 241-255.

- 265.** E. Vincent, V. Dupuis, M. Alba, J. Hammann, and J. P. Bouchaud, “Aging phenomena in spin-glass and ferromagnetic phases: Domain growth and wall dynamics,” *Euro phys Lett.*, 2000, vol. 50, no. 5, pp. 674-680.
- 266.** K. Manna, A. K. Bera, M. Jain, S. Elizabeth, S. M. Yusuf, P. S. Anil Kumar, “Structural-modulation-driven spin canting and reentrant glassy magnetic phase in ferromagnetic  $\text{Lu}_2\text{MnNiO}_6$ ” *Physical Review B*, 2015, vol. 91, no. 224420 pp. 1-7.
- 267.** P. Mahadevan, F. Aryasetiawan, A. Janotti, T. Sasaki, “Evolution of the electronic structure of a ferromagnetic metal: Case of  $\text{SrRuO}_3$ ” *Physical Review B*, 2009, vol. 80, no. 035106 pp. 1-4.
- 268.** R. I. Dass, J. Q. Yan, J. B. Goodenough, “Oxygen stoichiometry, ferromagnetism, and transport properties of  $\text{La}_{2-x}\text{NiMnO}_{6+\delta}$ ”, *Physical Review B*, 2003, vol. 68, no. 064415 pp. 1-12.
- 269.** L. T. Coutrim, E. M. Bittar, F. Stavale, F. Garcia, E. Baggio-Saitovitch, M. Abbate, R. J. O. Mossaneck, H. P. Martins, D. Tobia, P. G. Pagliuso et. al., “Compensation temperatures and exchange bias in  $\text{La}_{1.5}\text{Ca}_{0.5}\text{CoIrO}_6$ ”, *Physical Review B*, 2016, vol. 93, no. 174406 pp. 1-10.
- 270.** M.S. Venkatesh, G.S.V. Raghavan, “An Overview of Dielectric Properties Measuring Techniques”, *Canadian biosystems engineering*, 2005, vol. 47, no.7, pp. 15-30.
- 271.** R. J. Cava, “Dielectric materials for applications in microwave communications”, *Journal of Materials chemistry.*, 2001, vol. 11, no.1 , pp 54-62.
- 272.** B.N. Parida, P.R. Das, R. Padhee, R.N.P. Choudhary, “Phase transition and conduction mechanism of rare earth based tungsten-bronze compounds.” *Journal of Alloys and Compounds.*, 2012, vol. 540, no.5 pp 267-274.

- 273.** K. P. Neupane, J. L. Cohn, H. Terashita, J. J. Neumeier, “Doping dependence of polaron hopping energies in  $\text{La}_{1-x}\text{Ca}_x\text{MnO}_3$  ( $0 \leq x \leq 0.15$ )” *Physical Review B*, 2006, vol. 74, no. 144428, pp. 1-5.
- 274.** D.O. Neill, R. M. Bowman, J.M. Gregg, “Dielectric enhancement and Maxwell–Wagner effects in ferroelectric superlattice structures,” *Applied Physics Letters.*, 2000, vol. 7, no. 10 pp. 1520-1522 .
- 275.** Y.Q. Lin, X. M. Chen, X.Q. Liu, “Relaxor-like dielectric behavior in  $\text{La}_2\text{NiMnO}_6$  double perovskite ceramics”, *Solid State Commun.*, 2009, vol. 149, no. 19, pp. 784-787 .
- 276.** Iguchi E, Ueda K, Jung W, “Conduction in  $\text{LaCoO}_3$  by small-polaron hopping below room temperature.” *Physical Review B*, 1996, vol. 54, no. 24, pp. 17431-17437 .
- 277.** G. Catalan, “Magnetocapacitance without magnetoelectric coupling.” *Applied Physics Letters.*, 2006, vol. 88, no. 102902 pp. 1-4.
- 278.** G. Srinivasan, E. T. Rasmussen, B. J. Levin, R. Hayes, “Magnetoelectric effects in bilayers and multilayers of magnetostrictive and piezoelectric perovskite oxides,” *Physical Review B*, 2002, vol. 65, no. 134402 pp. 1-7.
- 279.** T. Katsufuji, H. Takagi, “Magnetocapacitance and spin fluctuations in the geometrically frustrated magnets  $\text{R}_2\text{Ti}_2\text{O}_7$  (R=rare earth) “, *Physical Review B*, 2004, vol. 69, no. 064422 pp. 1-5.
- 280.** Asish K. Kundu, R. Ranjith, V. Pralong, V. Caignaert, B. Raveau, “Enhancement of ferromagnetism by Co and Ni substitution in the perovskite  $\text{LaBiMn}_2\text{O}_{6+\delta}$ ”, *Journal of Materials Chemistry*, 2008, vol. 18, no. 4280 pp. 3347-3353 .
- 281.** Gaurav Sharma, Shekhar Tyagi, V. R. Reddy, A. M. Awasthi, R. J. Choudhary, A. K. Sinha, Vasant Sathe, “Spin-lattice coupling mediated giant magnetodielectricity across

- the spin reorientation in  $\text{Ca}_2\text{FeCoO}_5$ ”, *Physical Review B*, 2019, vol. 99, no. 024436 pp. 1-6.
- 282.** A. Pimenov, A. A. Mukhin, V. Y. Ivanon, V. D. Travkin, A. Balbashov, A. Loid, “Possible evidence for electromagnons in multiferroic manganites”, *Nature Physics*, 2006, vol. 2, pp 97-100.
- 283.** J. P. Palakkal, P. Neenu Lekshmi, Senoy Thomas, Matjaz Valant, K.G. Suresh, Manoj Raama Varma, “Polarons induced electronic transport, dielectric relaxation and magnetodielectric coupling in spin frustrated  $\text{Ba}_2\text{FeWO}_6$ ”, *Maters. Res. Bull. Tn.*, 2016, vol. 76, pp. 161-168.
- 284.** K Devi Chandrasekhar, A K Das, C Mitra, A Venimadhav, “The extrinsic origin of the magnetodielectric effect in the double perovskite  $\text{La}_2\text{NiMnO}_6$ ”, *Journal of Physics: Condensed Matter*, 2012, vol. 24, no. 495901 pp. 1-9.
- 285.** D. L. Rousseau, R. P. Bauman, S.P.S. Porto, “Normal mode determination in crystals”, *Journal of Raman Spectroscopy.*, 1981, vol. 10, no. 1, pp 253-290.
- 286.** C. J. Howard, B. J. Kennedy, P. M. Woodward, “Ordered double perovskites - a group-theoretical analysis.” *Acta Crystallographica Section B*, 2003, vol. 59, pp. 463-471.
- 287.** K. Gautam, A. Ahad, K. Dey, S. S. Majid, S. Francoual, V. G. Sathe, Ivan da Silva, D. K. Shukla, “Symmetry breaking and spin lattice coupling in  $\text{NdCrTiO}_5$ ”, *PHYSICAL REVIEW B*, 2019, vol. 100, no.104106, pp. 1-8.
- 288.** S.Baidya, and T. Saha-Dasgupta, "Electronic structure and phonons in  $\text{La}_2\text{CoMnO}_6$ : a ferromagnetic insulator driven by Coulomb-assisted spin-orbit coupling." *Physical Review B*, 2011, vol. 84, no. 3, pp. 035131.

- 289.** R. C. Sahoo, S. K. Giri, D. Paladhi, A. Das, and T. K. Nath, “Evidence of cluster-glass-like state at low temperature in anti-site disordered  $\text{La}_{1.5}\text{Ca}_{0.5}\text{CoMnO}_6$  double perovskite”, *Journal of Applied Physics*, 2016, vol. 120, no. 3, pp. 033906.
- 290.** S. Vasala, M. Karppinen “ $\text{A}_2\text{B}'\text{B}''\text{O}_6$  perovskites: a review”, *Progress in solid state chemistry*, 2015, vol. 43, no. 1-2, pp. 1-36.
- 291.** K. Ueda, H. Tabata, T. Kawai, “Ferromagnetism in  $\text{LaFeO}_3$ - $\text{LaCrO}_3$  superlattices”, *Science*, 1998, vol. 280, no. 5366, pp. 1064-1066.
- 292.** Y. Mao, J. Parsons, J. S. McCloy, “Magnetic properties of double perovskite  $\text{La}_2\text{BMnO}_6$  (B= Ni or Co) nanoparticles”, *Nanoscale*, 2013, vol. 5, no. 11 pp. 4720-4728.
- 293.** S. Zhao, L. Shi, S. Zhou, J. Zhao, H. Yang, Y. Guo, 2009, “Size-dependent magnetic properties and Raman spectra of  $\text{La}_2\text{NiMnO}_6$  nanoparticles”, *Journal of Applied Physics*, 2009, vol. 106, no. 12, pp. 123901.
- 294.** H. Guo, J. Burgess, S. Street, A. Gupta, T. G. Calvarese, M. A. Subramanian, “Growth of epitaxial thin films of the ordered double perovskite  $\text{La}_2\text{NiMnO}_6$  on different substrates” *Applied physics letters*, 2006, vol. 89, no. 2, pp. 022509.
- 295.** J. K. Murthy, K. D. Chandrasekhar, H. C. Wu, H. D. Yang, J. Y. Lin, A. Venimadhav, “Antisite disorder driven spontaneous exchange bias effect in  $\text{La}_{2-x}\text{Sr}_x\text{CoMnO}_6$  ( $0 \leq x \leq 1$ )”, *Journal of Physics: Condensed Matter*, 2016, vol. 28, no. 8, pp. 086003.
- 296.** K. Yoshimatsu, K. Nogami, K. Watarai, K. Horiba, H. Kumigashira, O. Sakata, T. Oshima, A. Ohtomo, 2015, “Synthesis and magnetic properties of double-perovskite oxide  $\text{La}_2\text{MnFeO}_6$  thin films”, *Physical Review B*, 2015, vol. 91, no. 5, pp. 054421.
- 297.** S. Giri, M. Patra, S. Majumdar, “Exchange bias effect in alloys and compounds” *Journal of Physics: Condensed Matter*, 2011, vol. 23, no. 7, pp. 073201.

- 298.** V. Kuncser, M. Valeanu, G. Schinteie, G. Filoti, I. Mustata, C. Lungu, A. Anghel, H. Chiriac, R. Vladoiu, J. Bartolome, “Exchange bias and spin valve systems with Fe-Mn antiferromagnetic pinning layers, obtained by the thermo-ionic vacuum arc method”, *Journal of Magnetism and Magnetic Materials*, 2008, vol. 320, no. 14, pp. e226-e230.
- 299.** J. Sort, J. Nogués, S. Suriñach, J. S. Muñoz, M. D. Baró, E. Chappell, F. Dupont, G. Chouteau, “Coercivity and squareness enhancement in ball-milled hard magnetic-antiferromagnetic composites.” *Applied Physics Letters*, 2001, vol. 79, no. 8, pp. 1142-1144.
- 300.** J. Sort, S. Suriñach, J. S. Muñoz, M. D. Baró, J. Nogués, G. Chouteau, V. Skumryev, G. C. Hadjipanayis, “Improving the energy product of hard magnetic materials”, *Physical Review B*, 2002, vol. 65, no. 17, pp. 174420.
- 301.** J. S. Kang, H. J. Lee, D. H. Kim, S. Kolesnik, B. Dabrowski, K. Swierczek, J. Lee, B. Kim, B. I. Min, “Valence and spin states, and the metal-insulator transition in ferromagnetic  $\text{La}_{2-x}\text{Sr}_x\text{MnNiO}_6$  ( $x = 0, 0.2$ ).” *Physical Review B*, 2009, vol. 80, no. 4 pp. 045115.
- 302.** I. O. Troyanchuk, A. P. Sazonov, H. Szymczak, D. M. Toebbens, H. Gamari-Seale, “Phase separation in  $\text{La}_{2-x}\text{A}_x\text{CoMnO}_6$  (A= Ca and Sr) perovskites”, *Journal of Experimental and Theoretical Physics*, 2004, vol. 99, no. 2, pp. 363-369.
- 303.** H. Gamari-Seale, I. O. Troyanchuk, A. P. Sazonov, K. L. Stefanopoulos, D. M. Toebbens, “Structure and magnetic order in  $\text{La}_{0.7}\text{Ca}_{0.3}\text{Mn}_{0.5}\text{Co}_{0.5}\text{O}_3$  and  $\text{La}_{0.8}\text{Sr}_{0.2}\text{Mn}_{0.5}\text{Co}_{0.5}\text{O}_3$  perovskites”, *Physica B: Condensed Matter*, 2008, vol. 403, no. 17, pp. 2924-2929.

- 304.** C. L. Bull, D. Gleeson, K. S. Knight, “Determination of B-site ordering and structural transformations in the mixed transition metal perovskites  $\text{La}_2\text{CoMnO}_6$  and  $\text{La}_2\text{NiMnO}_6$ ”, *Journal of Physics: Condensed Matter*, 2003, vol. 15, no. 29, pp. 4927..
- 305.** T. K. Mandal, J. Gopalakrishnan, “New route to ordered double perovskites: synthesis of rock salt oxides,  $\text{Li}_4\text{MWO}_6$ , and their transformation to  $\text{Sr}_2\text{MWO}_6$  (M= Mg, Mn, Fe, Ni) via metathesis”, *Chemistry of materials*, 2005, vol. 17, no. 9, pp.2310-2316.
- 306.** A. V. Naumkin, A. K. Vass, S. W. Gaarenstroom, C. J. Powell for (compilation and evaluation), NIST Standard Reference Database 20, Version 4.1, <http://srdata.nist.gov/xps/>
- 307.** S. Mickevicius, S. Grebinskij, V. Bondarenka, B. Vengalis, K. Sliuzien, B. A. Orłowski, V. Osinniy, W. Drube, “Investigation of epitaxial  $\text{LaNiO}_{3-x}$  thin films by high-energy XPS”, *Journal of alloys and compounds*, 2006, vol. 423, no. 1-2, pp. 107-111.
- 308.** Y. Uwamino, Y. Ishizuka, H. Yamatera, “X-ray photoelectron spectroscopy of rare-earth compounds”, *Journal of Electron Spectroscopy and Related Phenomena*, 1984, vol. 34, no. 1, pp. 67-78.
- 309.** Q. Liu, J. Li, Z. Zhou, J. Xie, J.Y. Lee, “Hydrophilic Mineral Coating of Membrane Substrate for Reducing Internal Concentration Polarization (ICP) in Forward Osmosis”, *Scientific Reports*, 2016, vol.6. pp. 19593.
- 310.** S. Laureti, E. Agostinelli, G. Scavia, G. Varvaro, V. R. Albertini, A. Generosi, B. Paci, A. Mezzi, and S. Kaciulis, “Effect of oxygen partial pressure on PLD cobalt oxide films”, *Applied surface science*, 2008, vol. 254, no. 16, pp. 5111-5115.



- 311.** C. A. F. Vaz, D. Prabhakaran, E. I. Altman, V. E. Henrich, Vaz. “Experimental study of the interfacial cobalt oxide in  $\text{Co}_3\text{O}_{4/\alpha} - \text{Al}_2\text{O}_3$  (0001) epitaxial films”, *Physical Review B*, 2009, vol. 80, no. 15, pp. 155457.
- 312.** F. Jin, Y. Shen, R. Wang, T. H. “Double-perovskite  $\text{PrBaCo}_{2/3}\text{Fe}_{2/3}\text{Cu}_{2/3}\text{O}_{5+\delta}$  as cathode material for intermediate-temperature solid-oxide fuel cells”, *Journal of Power Sources*, 2013, vol. 234, pp. 244-251.
- 313.** M. Ghaffari, M. Shannon, H. Hui, O.K. Tan, A. Irannejad, “Preparation, surface state and band structure studies of  $\text{SrTi}_{(1-x)}\text{Fe}_{(x)}\text{O}_{(3-\delta)}$  ( $x=0-1$ ) perovskite-type nano structure by X-ray and ultraviolet photoelectron spectroscopy”, *Surface science*, 2012, vol. 606, no. 5-6, pp. 670-677.
- 314.** H. Falcón, J.A. Barbero, G. Araujo, M.T. Casais, M.J. Martíneze Lope, J.A. Alonso, J.L.G. Fierro, “Double perovskite oxides  $\text{A}_2\text{FeMoO}_{6-\delta}$  ( $\text{A} = \text{Ca}, \text{Sr}$  and  $\text{Ba}$ ) as catalysts for methane combustion” *Applied Catalysis B: Environmental*, 2004, vol. 53, no. 1, pp. 37-45.
- 315.** J. P. Perdew, K. Burke, M. Ernzerhof, “Generalized gradient approximation made simple” *Physical review letters*, 1996, vol. 77, no. 18, pp. 3865.
- 316.** K. K. Mishra, R. Shukla, P. S. R. Krishna, P. D. Babu, S. N. Achary R. S. Katiyara, J. F. Scotta, “Phonon and magnetoelastic coupling in  $\text{Al}_{0.5}\text{Ga}_{0.5}\text{FeO}_3$ : Raman, magnetization and neutron diffraction studies”, *Physical Chemistry Chemical Physics*, 2020, vol. 22, no. 13, pp. 6906-6918.
- 317.** S. Rayaprol, Renan A.P. Ribeiro, Kiran Singh, V.R. Reddy, S.D. Kaushik, Sergio R. de Lazaro, “Experimental and theoretical interpretation of magnetic ground state of  $\text{FeMnO}_3$ ” *Journal of Alloys and Compounds*, 2019, vol. 774, pp. 290-298.

- 318.** J. A. Mydosh, “Spin glasses: Some recent experiments”, *Hyperfine Interactions*, 1986, vol.31, no. 1-4, pp. 347-362.
- 319.** J. K. Murthy, A. Venimadhav, “Giant zero field cooled spontaneous exchange bias effect in phase separated  $\text{La}_{1.5}\text{Sr}_{0.5}\text{CoMnO}_6$ ”, *Applied Physics Letters*, 2013, vol. 103, no. 25, pp.252410.
- 320.** R.C. Sahoo, Sananda Das, T.K. Nath, “Effect of rare earth site substitution on magnetic and transport properties of  $\text{Ln}_2\text{CoMnO}_6$  (Ln= La, Sm and Gd) double perovskites”, *Journal of Magnetism and Magnetic Materials*, 2018, vol. 460, pp.409-417.
- 321.** J. Blasco, J. Garcia, G. Subias, J. Stankiewicz, J. A. Rodriguez-Velamazan, C. Ritter, J. L. Garcia-Munoz, F. Fauth, “Magnetoelectric and structural properties of  $\text{Y}_2\text{CoMnO}_6$ : The role of antisite defects”, *Physical Review B*, 2016, vol.93, no. 21, pp. 214401.
- 322.** R. Egoavil, S. Huhn, M. Jungbauer, N. Gauquelin, A. Beche, G. Van Tendeloo, J. Verbeeck, V. Moshnyaga, “Phase problem in the B-site ordering of  $\text{La}_2\text{CoMnO}_6$ : impact on structure and magnetism”, *Nanoscale*, 2015, vol.7, no. 21, pp. 9835-9843.
- 323.** T. Asaka, X. Z.Yu, Y. Tomioka, Y. Kaneko, T. Nagai, K.Kimoto, K. Ishizuka, Y. Tokura, Y. Matsui, “Strong pinning effect and magnetic nanodomain formation by coupling between magnetic and crystallographic domains in the ordered double perovskite  $\text{Ba}_2\text{FeMoO}_6$ ”, *Physical Review B*, 2007, vol.75, no. 18, pp. 184440.
- 324.** A. J. Bray, M. A. Moore, “On the eigenvalue spectrum of the susceptibility matrix for random spin systems”, *Journal of Physics C: Solid State Physics*, 1982, vol.15, no. 23, pp. L765.
- 325.** R. B. Griffiths, Griffiths, “Nonanalytic behavior above the critical point in a random Isingferromagnet”, *Physical Review Letters*, 1969, vol. 23, no. 1, pp.17.

- 326.** A. Karmakar, S. Majumdar, S. Kundu, T. K. Nath, S. Giri, “A Griffiths-like phase in antiferromagnetic  $R_{0.5}Eu_{0.5}MnO_3$  (R= Pr, Nd, Sm)”, *Journal of Physics: Condensed Matter*, 2013, vol. 25, no. 6, pp. 066006.
- 327.** J. Deisenhofer, D. Braak, H.-A. Krug von Nidda, J. Hemberger, R. M. Eremina, V. A. Ivanshin, A. M. Balbashov, G. Jug, A. Loidl, T. Kimura, Y. Tokura, “Observation of a Griffiths phase in paramagnetic  $La_{1-x}Sr_xMnO_3$ ”, *Physical review letters*, 2005, vol. 95, no. 25 pp. 257202.
- 328.** Chandan De, Ajaya K. Nayak, Michael Nicklas, A. Sundaresan, “Magnetic compensation-induced sign reversal of exchange bias in a multi-glass perovskite  $SmFeO_3$ ”, *Applied Physics Letters*, 2017, vol. 111, no. 18, pp. 182403.
- 329.** J. P. Palakkal, , C. R.Sankar, M. R.Varma, “Multiple magnetic transitions, Griffiths-like phase, and magnetoresistance in  $La_2CrMnO_6$ ”, *Journal of Applied Physics*, 2017, vol. 122, no.7, pp.073907.
- 330.** N. Hanasaki, K. Watanabe, T. Ohtsuka, I. Kézsmárki, S. Iguchi, S. Miyasaka, Y. Tokura, “Nature of the transition between a ferromagnetic metal and a spin-glass insulator in pyrochloremolybdates”, *Physical review letters*, 2007, vol. 99, no. 8, pp. 086401.
- 331.** R. P. Madhogaria, R. Das, E. M. Clements, V. Kalappattil, M. H. Phan, H. Srikanth, “Evidence of long-range ferromagnetic order and spin frustration effects in the double perovskite  $La_2CoMnO_6$ ”, *Physical Review B*, 2019, vol. 99, no. 10, pp.104436.
- 332.** R. R. Das, P. Parida, A. K. Bera, T. Chatterji, B. R. K. Nanda, P. N. Santhosh, “Giant exchange bias in the single-layered Ruddlesden-Popper perovskite  $SrLaCo_{0.5}Mn_{0.5}O_4$ ”, *Physical Review B*, 2018, vol. 98, no. 18, pp. 184417.

- 333.** C.Binek, “Training of the exchange-bias effect: A simple analytic approach”, *Physical Review B*, 2004, vol. 70, no. 1, pp. 014421.
- 334.** A. Harres, M. Mikhov, V. Skumryev, A. M. H. de Andrade, J. E. Schmitz, J. Geshev, “Criteria for saturated magnetization loop”, *Journal of Magnetism and Magnetic Materials*, 2016, vol. 402, pp. 76-82.
- 335.** A. Banerjee, J. Sannigrahi, S. Giri, S. Majumdar, Banerjee, “Magnetization reversal and inverse exchange bias phenomenon in the ferrimagnetic polycrystalline compound  $\text{Er}_2\text{CoMnO}_6$ ”, *Physical Review B*, 2018, vol. 98, no. 10, pp. 104414.
- 336.** D. Niebieskikwiat, M. B. Salamon, “Intrinsic interface exchange coupling of ferromagnetic nanodomains in a charge ordered manganite”, *Physical Review B*, 2005, vol. 72, no. 17, pp. 174422.

## List of Publications

1. Prajyoti Singh, A. Pal, Vinod K. Gangwar, Surajit Ghosh, Ranjan K. Singh, A.K. Ghosh, Sandip Chatterjee, '**Spin freezing and field induced transition in  $(\text{Tb}_{1-x}\text{Eu}_x)_2\text{Ti}_2\text{O}_7$  : a magnetic property study,**' Journal of Magnetism and Magnetic Materials. 490, 165512 (2019).
2. Prajyoti Singh, A. Pal, Vinod K. Gangwar, Mohd Alam, Surajit Ghosh, Ranjan K. Singh, A.K. Ghosh, Sandip Chatterjee, '**Wasp-Waisted loop and spin frustration in  $\text{Dy}_{2-x}\text{Eu}_x\text{Ti}_2\text{O}_7$ ,**' Journal of Magnetism and Magnetic Materials. 518, 167364 (2020).
3. Prajyoti Singh, Mohd Alam, Shiv Kumar, Khyati Anand, Vinod K Gangwar, Surajit Ghosh, M Sawada, K Shimada , R K Singh, A K Ghosh. Sandip Chatterjee, '**Roles of Re-entrant Cluster glass state and Spin lattice coupling in magneto-dielectric behavior of giant dielectric double perovskite  $\text{La}_{1.8}\text{Pr}_{0.2}\text{CoFeO}_6$ ,**' Journal of Physics: Condensed Matter. **32**, 445801 (2020).
4. Prajyoti Singh, Mohd Alam, Samvab Dan, Khyati Anand, Rahul Singh, A. Jain, S.M. Yusuf, Amish G Joshi, Sandip Chatterjee, '**Double glassy states and large spontaneous and conventional exchange bias effect in  $\text{La}_{1.5}\text{Ca}_{0.5}\text{CoFeO}_6$  double perovskite**' (2020) {To be communicated}.
5. Prajyoti Singh, Mohd Alam, Vinod K Gangwar, Sandip Chatterjee, '**Structure and Magneto transport study of La deficient  $\text{La}_{1.7}\text{Pr}_{0.2}\text{CoFeO}_6$  double perovskite**', Sandip Chatterjee, AIP Conference Proceeding, 2265, 1 (2020).
6. Mohd. Alam, Prajyoti Singh, Khyati Anand, Arkadeb Pal, Surajit Ghosh, A K Ghosh, Ranjan K Singh, Amish G Joshi, Sandip Chatterjee, '**Extraordinary magnetic**

- properties of double perovskite  $\text{Eu}_2\text{CoMnO}_6$  wide band gap semiconductor**',  
Journal of Physics: Condensed Matter. 32, 365802 (2020).
7. A. Pal, Prajyoti Singh, Vinod K Gangwar, S. Ghosh, P. Prakash, S. K. Saha, Amitabh Das, Sandip Chatterjee, '**B – site disorder driven multiple-magnetic phases: Griffith Phase, re-entrant spin glass, exchange-Bias in  $\text{Pr}_2\text{CoFeO}_6$** ,' App. Phys. Lett. 114, 252403 (2019).
  8. A. Pal, S. Ghosh, A. Joshi, S. Kumar, P.K. Gupta, Prajyoti Singh, Sandip Chatterjee, '**Investigation of multi-mode spin-phonon coupling and local B-site disorder in  $\text{Pr}_2\text{CoFeO}_6$  by XPS and XAS studies**,' Journal of Physics: Condensed Matter, 31, 275802 (2019).
  9. A. Pal, Prajyoti Singh, V K Gangwar, Amish G Joshi, P Khuntia, G D Dwivedi, Prince K Gupta, Mohd Alam, Khyati Anand, K Sethupathi, Anup K Ghosh, Sandip Chatterjee, '**Probing the Griffiths like phase, unconventional dual glassy state, giant exchange Bias effects and its correlation with its electronic structure in  $\text{Pr}_{2-x}\text{Sr}_x\text{CoFeO}_6$** ,' Journal of Physics: Condensed Matter 32 (21), 215801 (2020).
  10. P. K. Gupta, S. Ghosh, S. Kumari, A. Pal, S. Roy, R. Singh, Prajyoti Singh, Sandip Chatterjee, '**Spin phonon coupling and magneto dielectric coupling in  $\text{BiFeO}_3\text{-TbMnO}_3$** ,' Mater. Res. Exprs., 6, 086114 (2019).
  11. P. K. Gupta, S. Ghosh, S. Kumar, A. Pal, Prajyoti Singh, Mohd Alam, Sandip Chatterjee, '**Room temperature exchange Bias in hard-soft antiferromagnetic composite  $\text{BiFeO}_3\text{-TbMnO}_3$** ,' Journal of Applied Physics 126 (24) : 243903 (2019).

12. S. Ghosh, A. Kumar, P. K. Gupta, A. Pal, K. Aanand, Prajyoti Singh, Sandip Chatterjee, '**Existence of Exchange Bias and Griffith Phase in  $(\text{Tb}_{1-x}\text{Ce}_x)\text{MnO}_3$ ,**' Journal of Magnetism and Magnetic Materials 500, 166261 (2020).
13. A Singh, S. Kumar, M Singh, Vinod K Gangwar, Prajyoti Singh, R Singh, K Shimada, Eike F Schwier, Takeshi Matsumura, Sandip Chatterjee, '**Anomalous Hall effect in Cu doped  $\text{Bi}_2\text{Te}_3$  Topological Insulator**', Journal of Physics Condensed Matter , 32, 305602 (2020).

## **Schools / Meetings / Workshops / Conference Attended**

1. 20<sup>th</sup> Symposium & Workshop on Thermal Analysis (THERMANS-2016), IIT BHU, VARANASI, INDIA.
2. Consortium Research Lecture Module, 1st Order Magnetic Phase Transitions and Some New Concepts (2017), UGC-DAE INDORE, INDIA.
3. The Indian Institute Of Metals (ICME-2017), IIT KANPUR, INDIA.
4. 10<sup>th</sup> National Conference on Solid State Chemistry and Allied Areas (ISCAS-2017), DTU, NEW DELHI, INDIA.
5. International Conference on Advances in Biological System and Materials Science in Nano World (2017), IIT BHU, VARANASI, INDIA.
6. 62<sup>nd</sup> DAE Solid State Physics Symposium (2017), BARC, MUMBAI, INDIA.
7. International Conference on Functional Nanomaterials (ICFNM-2019), IIT BHU, VARANASI, INDIA.
8. 64<sup>nd</sup> DAE Solid State Physics Symposium (2019), IIT JODHPUR, INDIA.