REFERENCES

References

Abdalla, A.M. Hossain, S. Azad, A.T. Petra, P.M.I. Begum, F. Eriksson, S.G. and Azad, A.K. "Nanomaterials for solid oxide fuel cells: a review," *Renewable and Sustainable Energy Reviews*, 82 (2018) 353-368.

Accardo, G. Frattini, D. Ham, H.C. Han, J.H. and Yoon, S.P. "Improved microstructure and sintering temperature of bismuth nano-doped GDC powders synthesized by direct sol-gel combustion," *Ceramics International*, *44* (2018) 3800-3809.

Afroze, S. Karim, A. Cheok, Q. Eriksson, S. and Azad, A.K. "Latest development of double perovskite electrode materials for solid oxide fuel cells: a review," *Frontiers in Energy*, *13* (2019), 770-797.

Ahmad, I. Akhtar, M.J. Younas, M. Siddique, M. and Hasan, M.M. "Small polaronic hole hopping mechanism and Maxwell-Wagner relaxation in $NdFeO_3$," *Journal of Applied Physics*, *112* (2012) 074105.

Ali, A. Rafique, A. Kaleemullah, M. Abbas, G. Ajmal Khan, M. Ahmad, M.A. and Raza, R. "Effect of alkali carbonates (single, binary, and ternary) on doped ceria: a composite electrolyte for low-temperature solid oxide fuel cells," *ACS applied materials & interfaces*, *10* (2018) 806-818.

Ali, S.M., Muchtar, A., Sulong, A.B., Muhamad, N. and Majlan, E.H. "Influence of sintering temperature on the power density of samarium-doped-ceria carbonate electrolyte composites for low-temperature solid oxide fuel cells," *Ceramics International*, *39* (2013) 5813-5820.

Amarsingh Bhabu, K. Theerthagiri, J. Madhavan, J. Balu, T. and Rajasekaran, T.R. "Superior oxide ion conductivity of novel acceptor doped cerium oxide electrolytes for intermediate-temperature solid oxide fuel cell applications," *The Journal of Physical Chemistry C*, *120* (2016) 18452-18461.

Anirban, S. and Dutta, A. “Structure and defect interaction mediated transport mechanism of mixed di-tri valent cation containing ceria-based Ionic conductors,” *International Journal of Hydrogen Energy, 43* (2018) 23418-23429.

Anirban, S. and Dutta, A. “Dielectric relaxation and charge carrier mechanism in nanocrystalline Ce–Dy ionic conductors,” *RSC advances, 6* (2016)a 49852-49861.

Anirban, S. and Dutta, A. “Microstructure and charge carrier dynamics in Pr-Sm-Eu triple-doped nanoceria,” *Solid State Ionics, 295* (2016)b 48-56.

Anirban, S. Paul, T. Das, P.T. Nath, T.K. and Dutta, A. “Microstructure and electrical relaxation studies of chemically derived Gd–Nd co-doped nanocrystalline ceria electrolytes,” *Solid State Ionics, 270* (2015) 73-83.

Anikina, P.V. Markov, A.A. Patrakeev, M.V. Leonidov, I.A. and Kozhevnikov, V.L. “The structure, nonstoichiometry, and thermodynamic characteristics of oxygen in strontium ferrite doped with niobium, $SrFe_{1-x}Nb_xO_{3-\delta}$,” *Russian Journal of Physical Chemistry A, 83* (2009), 699-704.

Anjaneya, K.C., Nayaka, G.P., Manjanna, J., Govindaraj, G. and Ganesha, K.N. “Preparation and characterization of $Ce_{1-x}Sm_xO_{2-\delta}$ (x= 0.1–0.3) as electrolyte material for intermediate temperature SOFC,” *Solid state sciences, 26* (2013) 89-96.

Anwar, M. SA, M.A. Baharuddin, N.A. Raduwan, N.F. Muchtar, A. and Somalu, M.R. “Structural, optical and electrical properties of $Ce_{0.8}Sm_{0.2-x}Er_xO_{2-\delta}$ (x= 0–0.2) Co-doped ceria electrolytes,” *Ceramics International, 44* (2018) 13639-13648.

Arabacı, A. and Öksüzömer, M.F.,” Preparation and characterization of 10 mol% Gd doped CeO_2 (GDC) electrolyte for SOFC applications,” *Ceramics International, 38* (2012) 6509-6515.

Arunkumar, P. Preethi, S. and Babu, K.S. “Role of iron addition on grain boundary conductivity of pure and samarium doped cerium oxide,” *RSC advances, 4* (2014) 44367-44376.

Babitha, K.K. Sreedevi, A. Priyanka, K.P. Sabu, B. and Varghese, T. “Structural characterization and optical studies of CeO_2 nanoparticles synthesized by chemical precipitation,” *Indian Journal of Pure & Applied Physics (IJPAP), 53* (2015) 596-603.

Babu, A.S. Bauri, R. and Reddy, G.S. “Processing and conduction behavior of nanocrystalline Gd-doped and rare earth co-doped ceria electrolytes,” *Electrochimica Acta, 209* (2016) 541-550.

Baqué, L.C. Soldati, A.L. Teixeira-Neto, E. Troiani, H.E. Schreiber, A. and Serquis, A.C. “Degradation of oxygen reduction reaction kinetics in porous $La_{0.6}Sr_{0.4}Co_{0.2}Fe_{0.8}O_{3-\delta}$ cathodes due to aging-induced changes in surface chemistry,” Journal of Power Sources, *337*, (2017) 166-172.

Barcikowski, S. Amendola, V. Marzun, G. Christoph, R. Reichenberger, S. Zhang, D. and Gökce, B. “Handbook of laser synthesis of colloids,” (2016)

Bevilacqua, M. Montini, T. Tavagnacco, C. Fonda, E. Fornasiero, P. and Graziani, M. “Preparation, characterization, and electrochemical properties of pure and composite $LaNi_{0.6}Fe_{0.4}O_{3-\delta}$ based cathodes for IT-SOFC,” Chem. Mater. 19 (2007) 5926-5936.

Bi, L. Da'as, E.H. and Shafi, S.P. “ Proton-conducting solid oxide fuel cell (SOFC) with Y-doped $BaZrO_3$ electrolyte,” *Electrochemistry Communications, 80* (2017) 20-23.

Brett, D.J. Atkinson, A. Brandon, N.P. and Skinner, S.J. “ Intermediate temperature solid oxide fuel cells,” Chem. Soc. Rev., 37 (2008) 1568-1578.

Burriel, M. Pena-Martinez, J. Chater, R.J. Fearn, S. Berenov, A.V. Skinner, S.J. and Kilner, J.A. “Anisotropic oxygen ion diffusion in layered $PrBaCo_2O_{5+\delta}$,” *Chemistry of Materials, 24* (2012) 613-621.

Cai, T., Zeng, Y., Yin, S., Wang, L. and Li, C. “Preparation and characterization of $Ce_{0.8}Sm_{0.2}O_{1.9}$ (SDC)–carbonates composite electrolyte via molten salt infiltration,” *Materials Letters, 65* (2011) 2751-2754.

Cebollero, J.A. Lahoz, R. Laguna-Bercero, M.A. and Larrea, A. “Tailoring the electrode-electrolyte interface of Solid Oxide Fuel Cells (SOFC) by laser micro-patterning to improve their electrochemical performance,” *Journal of Power Sources, 360* (2017) 336-344.

Chalk, S.G. Miller, J.F. and Wagner, F.W. “Challenges for fuel cells in transport applications,” *Journal of Power sources, 86* (2000) 40-51.

Chen, D. and Shao, Z. “Surface exchange and bulk diffusion properties of $Ba_{0.5}Sr_{0.5}Co_{0.8}Fe_{0.2}O_{3-\delta}$ mixed conductor, “ *International journal of hydrogen energy, 36* (2011) 6948-6956.

Chen, P.L. and Chen, I.W.”Grain growth in CeO_2: dopant effects, defect mechanism, and solute drag,”(1996).

Choi, S. Sengodan, S. Park, S. Ju, Y.W. Kim, J. Hyodo, J. Jeong, H.Y. Ishihara, T. Shin, J. and Kim, G. “A robust symmetrical electrode with layered perovskite structure for direct hydrocarbon solid oxide fuel cells: $PrBa_{0.8}Ca_{0.2}Mn_2O_{5+\delta}$,” *Journal of Materials Chemistry A, 4* (2016) 1747-1753.

Choi, S. Yoo, S. Kim, J. Park, S. Jun, A. Sengodan, S. Kim, J. Shin, J. Jeong, H.Y. Choi, Y. and Kim, G. “Highly efficient and robust cathode materials for low-temperature solid oxide fuel cells: $PrBa_{0.5}Sr_{0.5}Co_{2-x}Fe_xO_{5+\delta}$,” *Scientific reports, 3* (2013) 1-6.

Chu, S. and Majumdar, A. “Opportunities and challenges for a sustainable energy future,” Nature 488 (2012) 294-303.

Cook, B.” Introduction to fuel cells and hydrogen technology,” *Engineering Science & Education Journal*, 11 (2002) 205-216.

Cullity, B.D. "*Elements of X-ray Diffraction*," Addison-Wesley Publishing, (1956).

Daza, P.C.C. Meneses, R.A.M. de Almeida Ferreira, J.L. Araujo, J.A. Rodrigues, A.C.M. and da Silva, C.R.M. "Influence of microstructural characteristics on ionic conductivity of ceria based ceramic solid electrolytes," *Ceramics International*, *44* (2018) 2138-2145.

De Larramendi, I.R. Ortiz-Vitoriano, N. Dzul-Bautista, I.B. and Rojo, T. "Designing perovskite oxides for solid oxide fuel cells," In *Perovskite Materials-Synthesis, Characterisation, Properties, and Applications*. IntechOpen (2016).

De Souza, R.A. and Kilner, J.A. "Oxygen transport in $La_{1-x}Sr_xMn_{1-y}Co_yO_{3\pm\delta}$ perovskites: Part I. Oxygen tracer diffusion," Solid State Ion.106 (1998), 175-187.

Di, J. Chen, M. Wang, C. Zheng, J. Fan, L. and Zhu, B. "Samarium doped ceria–(Li/Na) $_2CO_3$ composite electrolyte and its electrochemical properties in low temperature solid oxide fuel cell," *Journal of Power Sources*, *195* (2010) 4695-4699.

Ding, D. Li, X. Lai, S.Y. Gerdes, K. and Liu, M." Enhancing SOFC cathode performance by surface modification through infiltration," Energy Environ. Sci. 7 (2014) 552-575.

Ding, X. Gao, X. Zhu, W. Wang, J. and Jiang, J. "Electrode redox properties of $Ba_{1-x}La_xFeO_{3-\delta}$ as cobalt free cathode materials for intermediate-temperature SOFCs " *International journal of hydrogen energy*, *39* (2014) 12092-12100.

Dixon, J.M. LaGrange, L.D. Merten, U. Miller, C.F. and Porter II, J.T. "Electrical resistivity of stabilized zirconia at elevated temperatures," *Journal of the Electrochemical Society*, *110* (1963) 276.

Dong, Y. Hampshire, S. Zhou, J.E. and Meng, G. "Synthesis and sintering of Gd-doped CeO_2 electrolytes with and without 1 wt.% CuO dopping for solid oxide fuel cell applications," *International journal of hydrogen energy*, *36* (2011) 5054-5066.

Duan, C. Tong, J. Shang, M. Nikodemski, S. Sanders, M. Ricote, S. Almansoori, A. and O'Hayre, R. "Readily processed protonic ceramic fuel cells with high performance at low temperatures," Science 349 (2015) 1321-1326.

Dussan, S. Kumar, A. Scott, J.F. and Katiyar, R.S. “Effect of electrode resistance on dielectric and transport properties of multiferroic superlattice: A Impedance spectroscopy study,” *AIP Advances, 2* (2012) 032136.

Efimov, K. Halfer, T. Kuhn, A. Heitjans, P. Caro, J. and Feldhoff, A. “Novel cobalt-free oxygen-permeable perovskite-type membrane,” *Chemistry of Materials, 22* (2010) 1540-1544.

Evdou, A. Zaspalis, V. and Nalbandian, L. “$La_{1-x}Sr_xFeO_{3-\delta}$ perovskites as redox materials for application in a membrane reactor for simultaneous production of pure hydrogen and synthesis gas,” *Fuel, 89* (2010) 1265-1273.

Facci, A.L. Cigolotti, V. Jannelli, E. and Ubertini, S. “Technical and economic assessment of a SOFC-based energy system for combined cooling, heating and power,” *Applied energy, 192* (2017) 563-574.

Falcón, H., Barbero, J.A., Alonso, J.A., Martínez-Lope, M.J. and Fierro, J.L.G. “$SrFeO_{3-\delta}$ perovskite oxides: chemical features and performance for methane combustion,” *Chemistry of materials, 14* (2002) 2325-2333.

Fan, L. Zhu, B. Su, P.C. and He, C.” Nanomaterials and technologies for low temperature solid oxide fuel cells: recent advances, challenges and opportunities,” *Nano Energy, 45* (2018) 148-176.

Fan, L. “Strongly coupled $Sm_{0.2}Ce_{0.8}O_2$-Na_2CO_3 nanocomposite for low temperature solid oxide fuel cells: One-step synthesis and super interfacial proton conduction,” J. Power Sources 386 (2018) 56-65.

Fan, L. Ma, Y. Wang, X. Singh, M. and Zhu, B. “Understanding the electrochemical mechanism of the core–shell ceria–LiZnO nanocomposite in a low temperature solid oxide fuel cell,” *Journal of Materials Chemistry A, 2* (2014) 5399-5407.

Feng, M. and Goodenough, J.B. “A superior oxide-ion electrolyte,” *European journal of solid state and inorganic chemistry, 31* (1994) 663-672.

Fergus, J.W. “Electrolytes for solid oxide fuel cells,” *Journal of power sources, 162* (2006), 30-40.

Fernández-Ropero, A.J. Porras-Vázquez, J.M. Cabeza, A. Slater, P.R. Marrero-López, D. and Losilla, E.R. “High valence transition metal doped strontium ferrites for electrode materials in symmetrical SOFCs,” *Journal of Power Sources*, *249* (2014) 405-413.

Ferreira, A.S., Soares, C.M., Figueiredo, F.M. and Marques, F.M., “Intrinsic and extrinsic compositional effects in ceria/carbonate composite electrolytes for fuel cells,” *International journal of hydrogen energy 36* (2011) 3704-3711.

Fruth, V. Ianculescu, A. Berger, D. Preda, S. Voicu, G. Tenea, E. and Popa, M. “Synthesis, structure and properties of doped Bi_2O_3,” *Journal of the European Ceramic Society*, *26* (2006) 3011-3016.

Fu, X. Liu, M. Meng, X. Lü, S. Wang, D. Zhang, Y. Liu, H. Song, M. Li, Z. and Wang, L. “Cobalt-free perovskite $Ln_{0.5}Sr_{0.5}Fe_{0.8}Cu_{0.2}O_{3-\delta}$ (Ln= Pr, Nd, Sm, and Gd) as cathode for intermediate-temperature solid oxide fuel cell,” *Ionics*, *26* (2020) 1285-1295.

Garan, C. A. “Estruturas ferroelétricas,” In: *Ferroelétricos.com*, (2003) http://ferroeletricos.com/perovskita.html.

Gao, Z. Mao, Z. Wang, C. Huang, J. and Liu, Z. “Composite electrolyte based on nanostructured $Ce_{0.8}Sm_{0.2}O_{1.9}$ (SDC) for low-temperature solid oxide fuel cells,” *International journal of energy research, 33* (2009) 1138-1144.

Gao, Z., Mogni, L.V., Miller, E.C., Railsback, J.G. and Barnett, S.A., “A perspective on low-temperature solid oxide fuel cells,” Energy Environ. Sci. 9 (2016) 1602-1644.

Gao, Z. Raza, R. Zhu, B. Mao, Z. Wang, C. and Liu, Z. "Preparation and characterization of $Sm_{0.2}Ce_{0.8}O_{1.9}/Na_2CO_3$ nanocomposite electrolyte for low-temperature solid oxide fuel cells," *International journal of hydrogen energy, 36* (2011) 3984-3988.

Ge, L. Li, R. He, S. Chen, H. and Guo, L. "Effect of titania concentration on the grain boundary conductivity of $Ce_{0.8}Gd_{0.2}O_{1.9}$ electrolytes," *International journal of hydrogen energy, 37* (2012) 16123-16129.

Ghosh, A. Azad, A. and Irvine, J.T. "Study of Ga Doped LSCM as an Anode for SOFC," *ECS Transactions,* 35 (2011) 1337.

Gil, V. Tartaj, J. Moure, C. and Duran, P. "Effect of Bi_2O_3 addition on the sintering and microstructural development of gadolinia-doped ceria ceramics.," *Journal of the European Ceramic Society, 27* (2007) 801-805.

Giorgi, L. and Leccese, F. "Fuel cells: Technologies and applications," *The Open Fuel Cells Journal, 6* (2013).

Goodenough, J.B. "Electrochemical energy storage in a sustainable modern society," *Energy & Environmental Science, 7* (2014) 14-18.

Grimaud, A. Mauvy, F. Bassat, J.M. Fourcade, S. Rocheron, L. Marrony, M. and Grenier, J.C. "Hydration properties and rate determining steps of the oxygen reduction reaction of perovskite-related oxides as H+-SOFC cathodes," *Journal of The Electrochemical Society, 159* (2012) B683.

Guo, X. and Waser, R. "Electrical properties of the grain boundaries of oxygen ion conductors: acceptor-doped zirconia and ceria," *Progress in Materials Science, 51* (2006), 151-210.

Harvey, D. "Modern Analytical Chemistry, A Division of the MC–Graw-Hill Companies," 1st Edn, (1956).

He, Y. Fan, L., Afzal, M. Singh, M. Zhang, W. Zhao, Y. Li, J. and Zhu, B." Cobalt oxides coated commercial $Ba_{0.5}Sr_{0.5}Co_{0.8}Fe_{0.2}O_{3-\delta}$ as high performance cathode for low-temperature SOFCs." *Electrochimica Acta, 191* (2016) 223-229.

Hirano, M. Watanabe, S. Kato, E., Mizutani, Y. Kawai, M. and Nakamura, Y. "High Electrical Conductivity and High Fracture Strength of Sc_2O_3-Doped Zirconia Ceramics with Submicrometer Grains," *Journal of the American Ceramic Society, 82* (10) 2861-2864.

Hirschenhofer, J.H. Stauffer, D.B. Engleman, R.R. and Klett, M.G. "*Fuel Cells: a handbook,"* Business/Technology Books (1996).

Hodges, J.P. Short, S. Jorgensen, J.D. Xiong, X. Dabrowski, B. Mini, S.M. and Kimball, C.W. "Evolution of Oxygen-Vacancy Ordered Crystal Structures in the Perovskite Series $Sr_nFe_nO_{3n-1}$ (n= 2, 4, 8, and 1), and the Relationship to Electronic and Magnetic Properties," J. Solid State Chem. 151 (2000)190–209.

Holtappels, P. and Stimming, U." Solid oxide fuel cells (SOFC)," *Handbook of fuel cells*, (2010).

Höök, M. and Tang, X. "Depletion of fossil fuels and anthropogenic climate change-A review," *Energy policy*, 52 (2013) 797-809.

Huang, J. Gao, Z. and Mao, Z. "Effects of salt composition on the electrical properties of samaria-doped ceria/carbonate composite electrolytes for low-temperature SOFCs" *International journal of hydrogen energy*, *35* (2010) 4270-4275.

Huang, J. Mao, Z. Liu, Z. and Wang, C. "Performance of fuel cells with proton-conducting ceria-based composite electrolyte and nickel-based electrodes," *Journal of Power Sources, 175* (2008) 238-243.

Huang, J. Mao, Z. Yang, L. and Peng, R. "SDC-carbonate composite electrolytes for low-temperature SOFCs," *Electrochemical and Solid State Letters, 8* (2005) A437.

Huang, K., Feng, M. and Goodenough, J.B. "Synthesis and electrical properties of dense $Ce_{0.9}Gd_{0.1}O_{1.95}$ ceramics," *Journal of the American Ceramic Society, 81* (1998) 357-362.

Hull, S. Norberg, S.T. Tucker, M.G. Eriksson, S.G. Mohn, C.E. and Stølen, S. " Neutron total scattering study of the δ and β phases of Bi_2O_3," *Dalton transactions,* 40 (2009) 8737-8745.

Iguchi, E., Kubota, N., Nakamori, T., Yamamoto, N. and Lee, K.J. "Polaronic conduction in n-type $BaTiO_3$ doped with La_2O_3 or Gd_2O_3," *Physical Review B, 43* (1991) 8646.

Inaba, H. and Tagawa, H. "Ceria-based solid electrolytes," *Solid state ionics, 83* (1996) 1-16.

Irvine, J.T. Sinclair, D.C. and West, A.R. "Electroceramics: characterization by impedance spectroscopy," *Advanced materials, 2* (1990) 132-138.

Ishihara, T. Matsuda, H. and Takita, Y. "Doped $LaGaO_3$ perovskite type oxide as a new oxide ionic conductor," *Journal of the American chemical society, 116* (1994), 3801-3803.

Jacobson, A.J. "Materials for solid oxide fuel cells," *Chemistry of Materials, 22* (2010) 660-674.

Jain, V. Bobade, S. Gulwade, D. and Gopalan, P. "Role of the salt phase in GDC and alumina-based composites," *Ionics, 16* (2010) 487-496.

Jaiswal, N., Kumar, D., Upadhyay, S. and Parkash, O. "High electrical conductivity of nanocomposites based on $Ce_{0.82}Sm_{0.16}Sr_{0.02}O_{1.90}$ and $(Li/Na)_2CO_3$ for low temperature solid oxide fuel cells," *Ceramics International, 42* (2016) 9004-9010.

Jaiswal, N. Tanwar, K. Suman, R. Kumar, D. Upadhyay, S. and Parkash, O. "A brief review on ceria based solid electrolytes for solid oxide fuel cells," *Journal of Alloys and Compounds, 781* (2019) 984-1005.

Jaiswal, N. Upadhyay, S. Kumar, D. and Parkash, O. "Ionic conduction in Mg^{2+} and Sr^{2+} co-doped ceria/carbonates nanocomposite electrolytes," *International Journal of Hydrogen Energy, 40* (2015) 3313-3320.

Jiang, S.P. "Development of lanthanum strontium manganite perovskite cathode materials of solid oxide fuel cells: a review," J. Mater. Sci. 43 (2008) 6799-6833.

Jiang, S.P. and Wang, X. Handbook of Solid State Electrochemistry. 2011. DOI 10.1002/9783527635566.ch5.

Jiang, S. Zhou, W. Niu, Y. Zhu, Z. and Shao, Z. "Phase Transition of a Cobalt-Free Perovskite as a High-Performance Cathode for Intermediate-Temperature Solid Oxide Fuel Cells," *ChemSusChem, 5* (2012) 2023-2031.

Ji, B. Tian, C. Wang, C. Wu, T. Xie, J. and Li, M. "Preparation and characterization of $Ce_{0.8}Y_{0.2-x}Cu_xO_{2-\delta}$ as electrolyte for intermediate temperature solid oxide fuel cells," *Journal of Power Sources, 278* (2015) 420-429.

Jin, Y.J. Liu, Z.G. Ding, Z.Y., Cao, G. Henniche, A. Zhang, H.B. Zhen, X.Y. and Ouyang, J.H. "Preparation and characterization of $GdSmZr_2O_7$–$(Li_{0.52}Na_{0.48})_2CO_3$ composite electrolyte for intermediate temperature solid oxide fuel cells," *Electrochimica Acta, 283* (2018) 291-299.

Jonscher, A.K." Dielectric relaxation in solids," *Journal of Physics D: Applied Physics, 32* (1999), p. R57.

Jonscher, A.K. "The 'universal'dielectric response," *Nature, 267* (1977) 673-679.

Joung, Y.H. Kang, H.I. Choi, W.S. and Kim, J.H. "Investigation of X-ray photoelectron spectroscopy and electrical conductivity properties of the layered perovskite $LnBaCo_2O_{5+\delta}$ (Ln= Pr, Nd, Sm, and Gd) for IT-SOFC," *Electronic Materials Letters, 9* (2013) 463-465.

Kang, Y.J. and Choi, G.M. “The effect of alumina and Cu addition on the electrical properties and the SOFC performance of Gd-doped CeO_2 electrolyte,” *Solid State Ionics, 180* (2009) 886-890.

Kahlaoui, M. Inoubli, A. Chefi, S. Mezni, A. Kouki, A. Madani, A. and Chefi, C. “ Structural, chemical, and electrochemical properties of co-doped fluorite oxides $Ce_{0.8}La_{0.2-x}Tl_xO_{2-\delta}$ as electrolyte materials for solid oxide fuel cells,” *International Journal of Hydrogen Energy, 41* (2016) 4751-4764.

Kaur, P. and Singh, K. “Review of perovskite-structure related cathode materials for solid oxide fuel cells,” *Ceramics International, 46* (2020) 5521-5535.

Khakpour, Z. Youzbashi, A.A. and Maghsoudipour, A. “Influence of Gd^{3+} and Dy^{3+} co-doping and sintering regime on enhancement of electrical conductivity of ceria-based solid electrolyte,” *Ionics, 20* (2014) 1407-1417.

Kharton, V.V., Marques, F.M.B. and Atkinson, A. “Transport properties of solid oxide electrolyte ceramics: a brief review,” *Solid State Ionics, 174* (2004) 135-149.

Kilner, J.A. and Brook, R.J. “A study of oxygen ion conductivity in doped non-stoichiometric oxides,” *Solid State Ionics, 6* (1982) 237-252.

Kim, D.J. “Lattice parameters, ionic conductivities, and solubility limits in fluorite-structure MO_2 oxide [M= Hf^{4+}, Zr^{4+}, Ce^{4+}, Th^{4+}, U^{4+}] solid solutions,” *Journal of the American Ceramic Society, 72* (1989) 1415-1421.

Kim, J.H. Prado, F. and Manthiram, A. “Characterization of $GdBa_{1-x}Sr_xCo_2O_{5+\delta}$ ($0 \leqslant x \leqslant 1.0$) Double Perovskites as Cathodes for Solid Oxide Fuel Cells,” *Journal of the Electrochemical Society, 155* (2008) B1023.

Kim, J.T. Lee, T.H. Park, K.Y. Seo, Y. Kim, K.B. Song, S.J. Park, B. and Park, J.Y. “Electrochemical properties of dual phase neodymium-doped ceria alkali carbonate composite electrolytes in intermediate temperature,” *Journal of Power Sources, 275* (2015) 563-572.

Kim, J.H. and Manthiram, A. “Layered $LnBaCo_2O_{5+\delta}$ perovskite cathodes for solid oxide fuel cells: an overview and perspective,” *Journal of Materials Chemistry A, 3* (2015) 24195-24210.

Kim, S. and Maier, J. “On the conductivity mechanism of nanocrystalline ceria,” *Journal of the Electrochemical society, 149* (2002) J73.

Knauth, P. and Tuller, H.L. “Solid-state ionics: roots, status, and future prospects,” *Journal of the American Ceramic Society, 85* (2002) 1654-1680.

Koc, R. and Anderson, H.U. “Electrical conductivity and Seebeck coefficient of (La, Ca)(Cr, Co)O_3 ,” *Journal of materials science, 27* (1992) 5477-5482.

Kosinski, M.R. and Baker, R.T. “Preparation and property–performance relationships in samarium-doped ceria nanopowders for solid oxide fuel cell electrolytes “*Journal of Power Sources, 196* (2011) 2498-2512.

Kuang, X. Green, M.A. Niu, H. Zajdel, P. Dickinson, C. Claridge, J.B. Jantsky, L. and Rosseinsky, M.J. “Interstitial oxide ion conductivity in the layered tetrahedral network melilite structure,” *Nature materials, 7* (2008) 498-504.

Kumar, S.A. Kuppusami, P. Vigneshwaran, B. and Fu, Y.P. “Codoped Ceria $Ce_{0.8}M_{0.1}Gd_{0.1}O_{2-\delta}$ (M= Sm^{3+}, Sr^{2+}, Ca^{2+}) and Codoped Ceria–Na_2CO_3 Nanocomposite Electrolytes for Solid Oxide Fuel Cells,” *ACS Applied Nano Materials, 2* (2019) 6300-6311.

Lapa, C.M. Figueiredo, F.M.L. De Souza, D.P.F. Song, L. Zhu, B. and Marques, F.M.B. “Synthesis and characterization of composite electrolytes based on samaria-doped ceria and Na/Li carbonates,” *International journal of hydrogen energy, 35* (2010) 2953-2957.

Lee, S.J. Muralidharan, P. Jo, S.H. and Kim, D.K. “Composite cathode for IT-SOFC: Sr-doped lanthanum cuprate and Gd-doped ceria,” Electrochem. Comm. 12 (2010) 808-811.

Li, C. Zeng, Y. Wang, Z. Xu, F. Ye, Z. and Shi, R. “An investigation of protonic and oxide ionic conductivities at the interfacial layers in SDC-LNC composite electrolytes,” *Electrochimica Acta*, *212* (2016) 583-593.

Lim, Y.H. Lee, J. Yoon, J.S. Kim, C.E. and Hwang, H.J. “Electrochemical performance of $Ba_{0.5}Sr_{0.5}CoxFe_{1-x}O_{3-\delta}$ (x= 0.2–0.8) cathode on a ScSZ electrolyte for intermediate temperature SOFCs,” *Journal of power sources*, *171* (2007) 79-85.

Lima, C.G. Santos, T.H. Grilo, J.P. Dutra, R.P. Nascimento, R.M. Rajesh, S. Fonseca, F.C. and Macedo, D.A. “Synthesis and properties of CuO-doped $Ce_{0.9}Gd_{0.1}O_{2-\delta}$ electrolytes for SOFCs,” *Ceramics International*, *41* (2015) 4161-4168.

Ling, Y. Zhang, X. Wang, S. Zhao, L. Lin, B. and Liu, X. “A cobalt-free $SrFe_{0.9}Sb_{0.1}O_{3-\delta}$ cathode material for proton-conducting solid oxide fuel cells with stable $BaZr_{0.1}Ce_{0.7}Y_{0.1}Yb_{0.1}O_{3-\delta}$ electrolyte,” *Journal of Power Sources*, *195* (2010) 7042-7045.

Lin, Y. Fang, S. Su, D. Brinkman, K.S. and Chen, F. “Enhancing grain boundary ionic conductivity in mixed ionic–electronic conductors,” *Nature communications*, *6* (2015) 1-9.

Li, Z.P. Mori, T. Zou, J. and Drennan, J. “Defects clustering and ordering in di-and trivalently doped ceria,” *Materials Research Bulletin*, *48* (2013), 807-812.

Liu, G.Y. Rao, G.H. Feng, X.M. Yang, H.F. Ouyang, Z.W. Liu, W.F. and Liang, J.K. “Structural transition and atomic ordering in the non-stoichiometric double perovskite $Sr_2Fe_xMo_{2-x}O_6$,” *Journal of alloys and compounds*, *353* (2003) 42-47.

Liu, Q. Dong, X. Xiao, G. Zhao, F. and Chen, F. “A novel electrode material for symmetrical SOFCs,” *Advanced materials*, *22* (2010) 5478-5482.

Liu, Y. Fan, L. Cai, Y. Zhang, W. Wang, B. and Zhu, B. “Superionic conductivity of Sm^{3+}, Pr^{3+}, and Nd^{3+} triple-doped ceria through bulk and surface two-step doping approach,” *ACS applied materials & interfaces*, *9* (2017) 23614-23623.

Lu, X.H. Huang, X. Xie, S.L. Zheng, D.Z. Liu, Z.Q. Liang, C.L. and Tong, Y.X. "Facile electrochemical synthesis of single crystalline CeO_2 octahedrons and their optical properties," *Langmuir, 26* (2010) 7569-7573.

Maier, J. "Ionic conduction in space charge regions," *Progress in solid state chemistry, 23*(1995) 171-263.

Malavasi, L. Fisher, C.A. and Islam, M.S. "Oxide-ion and proton conducting electrolyte materials for clean energy applications: structural and mechanistic features," *Chemical Society Reviews, 39* (2010) 4370-4387.

Markov, A.A. Leonidov, I.A. Patrakeev, M.V. Kozhevnikov, V.L. Savinskaya, O.A. Ancharova, U.V. and Nemudry, A.P. " Structural stability and electrical transport in $SrFe_{1-x}Mo_xO_{3-\delta}$," *Solid State Ionics, 179* (2008) 1050-1053.

Ma, Y., Wang, X., Li, S., Toprak, M.S., Zhu, B. and Muhammed, M. " Samarium-doped ceria nanowires: novel synthesis and application in low-temperature solid oxide fuel cells," *Advanced materials, 22* (2010) 1640-1644.

Ma, Y. Wang, X. Raza, R. Muhammed, M. and Zhu, B. "Thermal stability study of SDC/Na_2CO_3 nanocomposite electrolyte for low-temperature SOFCs, " *International journal of hydrogen energy, 35* (2010) 2580-2585.

Möbius H H. "High Temperature and Solid Oxide Fuel Cells," Chapter 2-History, Oxford Elsevier (2003) 23–51.

Mogensen, M. Sammes, N.M. and Tompsett, G.A. " Physical, chemical and electrochemical properties of pure and doped ceria" *Solid State Ionics, 129* (2000) 63-94.

Mohn, C.E., Stølen, S., Norberg, S.T. and Hull, S. "Oxide-ion disorder within the high temperature δ phase of Bi_2O_3," *Physical review letters, 102* (2009) 155502.

Myung, J.H. Shin, T.H. Huang, X. Carins, G. and Irvine, J.T. “Enhancement of redox stability and electrical conductivity by doping various metals on ceria, $Ce_{1-x}M_xO_{2-\delta}$ (M= Ni, Cu, Co, Mn, Ti, Zr),” *International journal of hydrogen energy*, *40* (2015) 12003-12008.

Neuhaus, K. Gerke, B. Niehaus, O. Koops, S. Hopp, T. Pöttgen, R. and Wiemhöfer, H.D. “Investigation of the cation valency and conductivity of antimony-substituted ceria,” *Journal of Solid State Electrochemistry, 20* (2016) 2295-2304.

Nicollet, C. Waxin, J. Dupeyron, T. Flura, A. Heintz, J.M. Ouweltjes, J.P. Piccardo, P. Rougier, A. Grenier, J.C. and Bassat, J.M. “Gadolinium doped ceria interlayers for Solid Oxide Fuel Cells cathodes: Enhanced reactivity with sintering aids (Li, Cu, Zn), and improved densification by infiltration,” *Journal of Power Sources, 372* (2017) 157-165.

Niu, Y. Sunarso, J. Liang, F. Zhou, W. Zhu, Z. and Shao, Z. “A comparative study of oxygen reduction reaction on Bi-and La-doped $SrFeO_{3-\delta}$ perovskite cathodes,” *Journal of the Electrochemical Society*, *158* (2010) B132.

Niu, Y. Zhou, W. Sunarso, J. Ge, L. Zhu, Z. and Shao, Z. “High performance cobalt-free perovskite cathode for intermediate temperature solid oxide fuel cells,” *Journal of Materials Chemistry, 20* (2010) 9619-9622.

Omar, S. “Doped Ceria for Solid Oxide Fuel Cells,” (2019) http://dx.doi.org/10.5772/intechopen.79170.

Omar, S. Wachsman, E.D. Jones, J.L. and Nino, J.C. “Crystal structure–ionic conductivity relationships in doped ceria systems,” *Journal of the American Ceramic Society, 92* (2009) 2674-2681.

Omar, S. Wachsman, E.D. and Nino, J.C. “A co-doping approach towards enhanced ionic conductivity in fluorite-based electrolytes. *Solid State Ionics, 177* (2006) 3199-3203.

Orera, V.M. Laguna-Bercero, M.A. and Larrea, A. “Fabrication methods and performance in fuel cell and steam electrolysis operation modes of small tubular solid oxide fuel cells: a review,” *Frontiers in Energy Research, 2* (2014) 22.

Ortega, N. Kumar, A. Scott, J.F. and Katiyar, R.S. “Multifunctional magnetoelectric materials for device applications,” *Journal of Physics: Condensed Matter, 27* (2015) 504002.

Panhans, M.A. and Blumenthal, R.N., “A thermodynamic and electrical conductivity study of nonstoichiometric cerium dioxide,” *Solid State Ionics, 60* (1993) 279-298.

Patrakeev, M.V. Kharton, V.V. Bakhteeva, Y.A. Shaula, A.L. Leonidov, I.A. Kozhevnikov, V.L. Naumovich, E.N. Yaremchenko, A.A. and Marques, F.M.B. “Oxygen nonstoichiometry and mixed conductivity of $SrFe_{1-x}M_xO_{3-\delta}$ (M= Al, Ga): Effects of B-site doping,” *Solid state sciences, 8* (2006) 476-487.

Patrakeev, M.V. Leonidov, I.A. and Kozhevnikov, V.L. “Applications of coulometric titration for studies of oxygen non-stoichiometry in oxides,”*Journal of Solid State Electrochemistry, 15* (2011), 931-954.

Patrakeev, M.V. Markov, A.A. Leonidov, I.A. Kozhevnikov, V.L. and Kharton, V.V. “Ion and electron conduction in $SrFe_{1-x}Sc_xO_{3-\delta}$,” *Solid State Ionics, 177* (2006) 1757-1760.

Peng, C. Wang, Y. Jiang, K. Bin, B.Q. Liang, H.W. Feng, J. and Meng, J. “Study on the structure change and oxygen vacation shift for $Ce_{1-x}Sm_xO_{2-y}$ solid solution,” *Journal of alloys and compounds, 349* (2003) 273-278.

Pihlatie, M. “*Stability of Ni-YSZ composites for solid oxide fuel cells during reduction and re-oxidation*,” VTT (2010).

Pradhan, D.K. Chowdhury, R.N.P. and Nath, T.K. “Magnetoelectric properties of $PbZr_{0.53}Ti_{0.47}O_3$–$Ni_{0.65}Zn_{0.35}Fe_2O_4$ multiferroic nanocomposites,” *Applied Nanoscience, 2* (2012) 261-273.

Pradhan, D.K., Choudhary, R.N.P., Rinaldi, C. and Katiyar, R.S. “Effect of Mn substitution on electrical and magnetic properties of $Bi_{0.9}La_{0.1}FeO_3$,” *Journal of Applied Physics, 106* (2009) 024102.

Prado-Gonjal, J. Schmidt, R. Espíndola-Canuto, J. Ramos-Alvarez, P. and Morán, E. “Increased ionic conductivity in microwave hydrothermally synthesized rare-earth doped ceria $Ce_{1-x}RE_xO_{2-(x/2)}$,” *Journal of Power Sources, 209* (2012)163-171.

Rafique, M. Nawaz, H. Shahid Rafique, M. Bilal Tahir, M. Nabi, G. and Khalid, N.R. “Material and method selection for efficient solid oxide fuel cell anode: recent advancements and reviews” *International Journal of Energy Research, 43* (2019) 2423-2446.

Rai, A. Mehta, P. and Omar, S. “Ionic conduction behavior in $Sm_xNd_{0.15-x}Ce_{0.85}O_{2-\delta}$,” *Solid State Ionics, 263* (2014) 190-196.

Ramesh, S. and Raju, K.J. “Preparation and characterization of $Ce_{1-x}(Gd_{0.5}Pr_{0.5})_xO_2$ electrolyte for IT-SOFCs,” *International journal of hydrogen energy, 37* (2012) 10311-10317.

Raza, R. Wang, X. Ma, Y. Liu, X. and Zhu, B. “Improved ceria–carbonate composite electrolytes,” *International Journal of Hydrogen Energy, 35* (2010) 2684-2688.
Raza, R., Zhu, B., Rafique, A., Naqvi, M.R. and Lund, P. “Functional ceria-based nanocomposites for advanced low-temperature (300–600°C) solid oxide fuel cell: a comprehensive review,” *Materials Today Energy, 15* (2020) 100373.

Ricca, C. Ringuedé, A. Cassir, M. Adamo, C. and Labat, F. “Conduction mechanisms in oxide–carbonate electrolytes for SOFC: highlighting the role of the interface from first-principles modeling,” *The Journal of Physical Chemistry C, 122* (2018) 10067-10077.

Rietveld, H.M. “Line profiles of neutron powder-diffraction peaks for structure refinement,” *Acta Crystallographica, 22* (1967) 151-152.

Rietveld, H.M. “A profile refinement method for nuclear and magnetic structures,” *Journal of applied Crystallography, 2* (1969) 65-71.

Ristoiu, T. Petrisor Jr, T. Gabor, M. Rada, S. Popa, F. Ciontea, L. and Petrisor, T. “Electrical properties of ceria/carbonate nanocomposites,” *Journal of alloys and compounds, 532* (2012) 109-113.

Rodríguez-Carvajal, J. “Recent advances in magnetic structure determination by neutron powder diffraction,” *Physica B: Condensed Matter, 192* (1993) 55-69.

Sammes, N.M., Tompsett, G.A., Näfe, H. and Aldinger, F., “Bismuth based oxide electrolytes—structure and ionic conductivity,” Journal of the European Ceramic Society, 19 (1999) 1801-1826.

Sarat, S. Sammes, N. and Smirnova, A. “Bismuth oxide doped scandia-stabilized zirconia electrolyte for the intermediate temperature solid oxide fuel cells,” *Journal of power sources, 160* (2006) 892-896.

Sato, K. “Grain-boundary structures associated with ionic transport in Gd-doped ceria nanostructured electrolyte,” *The Journal of Physical Chemistry C, 119* (2015) 5734-5738.

Savinskaya, O. A. and Nemudry, A.P. “Oxygen transport properties of nanostructured $SrFe_{1-x}Mo_xO_{2.5+3/2x}$ ($0< x< 0.1$) perovskites” *Journal of Solid State Electrochemistry, 15* (2011) 269-275.

Savinskaya, O.A. Nemudry, A.P. and Lyakhov, N.Z. “Synthesis and properties of $SrFe_{1-x}M_xO_{3-z}$(M= Mo, W) perovskites.,” *Inorganic Materials, 43* (2007) 1350-1360.

Schrödl, N. Bucher, E. Egger, A. Kreiml, P. Teichert, C. Hoeschen, T. and Sitte, W. “Long-term stability of the IT-SOFC cathode materials $La_{0.6}Sr_{0.4}CoO_{3-\delta}$ and $La_2NiO_{4+\delta}$ against combined chromium and silicon poisoning,” Solid State Ion. 276 (2015) 62-71.

Schober, T. “Composites of ceramic high-temperature proton conductors with inorganic compounds,” *Electrochemical and Solid State Letters, 8* (2005) A199.

Senarıs-Rodrıguez, M.A. and Goodenough, J.B. “Magnetic and Transport Properties of the System $La_{1-x}Sr_xCoO_{3-\delta}$ ($0< x\leq 0.50$),” *Journal of Solid State Chemistry, 118* (1995), 323-336.

Shaikh, S.P. Muchtar, A. and Somalu, M.R. “A review on the selection of anode materials for solid-oxide fuel cells,” *Renewable and Sustainable Energy Reviews,* 51 (2015) 1-8.

Shannon, R.D., “Revised effective ionic radii and systematic studies of interatomic distances in halides and chalcogenides. *Acta crystallographica section A: crystal physics, diffraction, theoretical and general crystallography*,” *32* (1976)751-767.

Shuk, P. Wiemhöfer, H.D. Guth, U.̈ Göpel, W. and Greenblatt, M. “Oxide ion conducting solid electrolytes based on Bi_2O_3,” *Solid State Ionics, 89* (1996) 179-196.

Sha, X. Lü, Z. Huang, X. Miao, J. Ding, Z. Xin, X. and Su, W. “Study on La and Y co-doped ceria-based electrolyte materials,” *Journal of Alloys and Compounds, 428* (2007) 59-64.

Shimonosono, T. Hirata, Y. Sameshima, S. and Horita, T. “Electronic Conductivity of La-Doped Ceria Ceramics,” *Journal of the American Ceramic Society, 88* (2005) 2114-2120.

Singhal, S.C. “Advances in solid oxide fuel cell technology,” *Solid state ionics,* 135 (2000), 305-313.

Singhal, S.C. “Solid oxide fuel cells for power generation,” *Wiley Interdisciplinary Reviews: Energy and Environment,* 3 (2014) 179-194.

Singhal, S.C. and Kendall, K. eds. “High-temperature solid oxide fuel cells: Fundamentals, design and applications,” Elsevier, (2003)

Simner, S.P. Bonnett, J.F. Canfield, N.L. Meinhardt, K.D. Sprenkle, V.L. and Stevenson, J.W. "Optimized lanthanum ferrite-based cathodes for anode-supported SOFCs," *Electrochemical and Solid State Letters, 5* (2002) A173.

Simner, S.P., Bonnett, J.F., Canfield, N.L., Meinhardt, K.D., Shelton, J.P., Sprenkle, V.L. and Stevenson, J.W. "Development of lanthanum ferrite SOFC cathodes," *Journal of power sources, 113* (2003) 1-10.

Skoog, D.A. Holler, F.J. and Crouch, S. R. "Instrumental Analysis, 6th, Indian Reprint" (2010).

Smit, W. "The role of fuel cells in energy storage. *Journal of Power Sources*," *86* (2000), 74-83.

Spiridigliozzi, L. Dell'Agli, G. Marocco, A. Accardo, G. Pansini, M. Yoon, S.P. Ham, H.C. and Frattini, D. "Engineered co-precipitation chemistry with ammonium carbonate for scalable synthesis and sintering of improved $Sm_{0.2}Ce_{0.8}O_{1.90}$ and $Gd_{0.16}Pr_{0.04}Ce_{0.8}O_{1.90}$ electrolytes for IT-SOFCs," *Journal of industrial and engineering chemistry, 59* (2018) 17-27.

Song, K.W. and Lee, K.T. "Characterization of $NdSrCo_{1-x}Fe_xO_{4+\delta}$ ($0 \leq x \leq 1.0$) intergrowth oxide cathode materials for intermediate temperature solid oxide fuel cells," *Ceramics International, 37* (2011), 573-577.

Stambouli, A.B. and Traversa, E. "Solid oxide fuel cells (SOFCs): a review of an environmentally clean and efficient source of energy," *Renewable and sustainable energy reviews, 6* (2002) 433-455.

Strickler, D.W. and Carlson, W.G. "Ionic conductivity of cubic solid solutions in the system $CaO—Y_2O_3—ZrO_2$," *Journal of the American Ceramic Society, 47* (1964) 122-127.

Steele, B.C. "Appraisal of $Ce_{1-y}Gd_yO_{2-y/2}$ electrolytes for IT-SOFC operation at 500° C," *Solid state ionics, 129* (2000), 95-110.

Stephens, I.E. and Kilner, J.A. “Ionic conductivity of $Ce_{1-x}Nd_xO_{2-x/2}$,”*Solid State Ionics*, *177* (2006) 669-676.

Steele, B.C. and Heinzel, A. “Materials for fuel-cell technologies,” Nature 414 (2001)345–352.

Suda, E. Pacaud, B. and Mori, M. “Sintering characteristics, electrical conductivity and thermal properties of La-doped ceria powders,” *Journal of alloys and compounds*, *408* (2006) 1161-1164.

Sudarsan, P. and Krishnamoorthy, S.B. “Grain boundary scavenging through reactive sintering of strontium and iron in samarium doped ceria electrolyte for IT-SOFC applications,” *Materials Research Bulletin, 100* (2018) 446-457.

Sumi, S., Rao, P.P., Deepa, M. and Koshy, P. “Electrical conductivity and impedance spectroscopy studies of cerium based aeschynite type semiconducting oxides: $CeTiMO_6$ (M= Nb or Ta),” *Journal of Applied Physics*, *108* (2010) 063718.

Sun, C. Hui, R. and Roller, J. “Cathode materials for solid oxide fuel cells: a review,” *Journal of Solid State Electrochemistry*, *14* (2010), 1125-1144.

Su, P.C. Chao, C.C. Shim, J.H “Solid oxide fuel cell with corrugated thin film electrolyte,” Nano letters, 8 (2008), 2289-2292.

Suntivich, J. Gasteiger, H.A. Yauuchi, N. Nakanishi, H. Goodenough, J.B. an Shao-Horn, Y. “Design principles for oxygen-reduction activity on perovskite oxide catalysts for fuel cells and metal–air batteries,” *Nature chemistry, 3* (2011) 546-550.

Sun, Y. Li, J. Zeng, Y. Amirkhiz, B.S. Wang, M. Behnamian, Y. and Luo, J. “Correction: A-site deficient perovskite: the parent for in situ exsolution of highly active, regenerable nano-particles as SOFC anodes,” *Journal of Materials Chemistry A*, *5* (2017) 852-853.

Tadokoro, S.K. and Muccillo, E.N.S. “Effect of Y and Dy co-doping on electrical conductivity of ceria ceramics,” *Journal of the European Ceramic Society*, *27* (2007) 4261-4264.

Takahashi, S. Nishimoto, S. Matsuda, M. and Miyake, M. “Electrode Properties of the Ruddlesden–Popper Series, $La_{n+1}Ni_nO_{3n+1}$ (n= 1, 2, and 3), as Intermediate-Temperature Solid Oxide Fuel Cells” *Journal of the American Ceramic Society*, *93* (2010) 2329-2333.

Takahashi, T. Iwahara, H. and Nagai, Y. “High oxide ion conduction in sintered Bi_2O_3 containing SrO, CaO or La_2O_3,” *Journal of Applied Electrochemistry*, *2* (1972) 97-104.

Takeda, Y. Kanno, K. Takada, T. Yamamoto, O. Takano, M. Nakayama, N. and Bando, Y. “Phase relation in the oxygen nonstoichiometric system, SrFeOx (2.5≤x≤3.0),” *Journal of solid statechemistry*, *63.* (1986) 237-249.

Tang, Z. Lin, Q. Mellander, B.E. and Zhu, B. “SDC–LiNa carbonate composite and nanocomposite electrolytes,” *International journal of hydrogen energy*, *35* (2010) 2970-2975.

Tuller, H.L. “Ionic conduction in nanocrystalline materials,” *Solid State Ionics*, *131*(2000) 143-157.

Uthayakumar, A., Pandian, A., Mathiyalagan, S., Kumar, A., Keshri, A.K., Omar, S., Balani, K. and Krishna Moorthy, S.B., “Interfacial effect of the oxygen-ion distribution on the conduction mechanism in strontium-added $Ce_{0.8}Sm_{0.2}O_{2-\delta}/Na_2CO_3$ nanocomposite,” *The Journal of Physical Chemistry C*, *120* (2016) 25068-25077.

Van Herle, J. Seneviratne, D. and McEvoy, A.J. “Lanthanide co-doping of solid electrolytes: AC conductivity behaviour,” *Journal of the European Ceramic Society*, *19* (1999), 837-841.

Vashuk, V.V. Kokhanovskii, L.V. and Yushkevich, I.I. “Electrical conductivity and oxygen stoichiometry of $SrFeO_{3-\delta}$,” *Inorganic materials*, *36* (2000) 79-83.

Venkataramana, K., Madhuri, C., Madhusudan, C., Reddy, Y.S., Bhikshamaiah, G. and Reddy, C.V. "Investigation on La^{3+} and Dy^{3+} co-doped ceria ceramics with an optimized average atomic number of dopants for electrolytes in IT-SOFCs," *Ceramics International, 44* (2018) 6300-6310.

Venkataramana, K. Madhuri, C. Reddy, Y.S. Bhikshamaiah, G. and Reddy, C.V. "Structural, electrical and thermal expansion studies of tri-doped ceria electrolyte materials for IT-SOFCs," *Journal of Alloys and Compounds, 719* (2017) 97-107.

Vollath, D. Szabo, D.V. and Hauβelt, J. "Synthesis and properties of ceramic nanoparticles and nanocomposites," *Journal of the European Ceramic Society, 17* (1997) 1317-1324.

Wachsman, E.D. and Lee, K.T. "Lowering the temperature of solid oxide fuel cells," Science, 334 (2011), 935-939.

Waerenborgh, J.C. Rojas, D.P. Shaula, A.L. Mather, G.C. Patrakeev, M.V. Kharton, V.V. and Frade, J.R. "Phase formation and iron oxidation states in $SrFe(Al)O_{3-\delta}$ perovskites," *Materials Letters, 59* (2005) 1644-1648.

Wang, F.Y. Chen, S. and Cheng, S. "Gd^{3+} and Sm^{3+} co-doped ceria based electrolytes for intermediate temperature solid oxide fuel cells," *Electrochemistry communications, 6* (2004) 743-746.

Wang, J. Chen, X. Xie, S. Chen, L. Wang, Y. Meng, J. and Zhou, D. "Bismuth tungstate/neodymium-doped ceria composite electrolyte for intermediate-temperature solid oxide fuel cell: Sintering aid and composite effect," *Journal of Power Sources, 428* (2019) 105-114.

Wang, L. Merkle, R. Maier, J. Acartürk, T. and Starke, U. "Oxygen tracer diffusion in dense $Ba_{0.5}Sr_{0.5}Co_{0.8}Fe_{0.2}O_{3-\delta}$ films," *Applied Physics Letters, 94* (2009) 071908.

Wang, S.F. Hsu, Y.F. Tsai, W.C. and Lu, H.C. “The phase stability and electrical conductivity of Bi_2O_3 ceramics stabilized by Co-dopants,” *Journal of Power Sources, 218* (2012) 106-112.

Wang, T. Hu, J. Yang, H. Jin, L. Wei, X. Li, C. Yan, F. and Lin, Y. “Dielectric relaxation and Maxwell-Wagner interface polarization in Nb_2O_5 doped $0.65BiFeO_3$–$0.35BaTiO_3$ ceramics,” *Journal of Applied Physics, 121* (2017) 084103.

Wang, X. Ma, Y. Raza, R. Muhammed, M. and Zhu, B. “Novel core–shell SDC/amorphous Na_2CO_3 nanocomposite electrolyte for low-temperature SOFCs,” *Electrochemistry Communications, 10* (2008) 1617-1620.

Wang, X. Ma, Y. and Zhu, B. “State of the art ceria-carbonate composites (3C) electrolyte for advanced low temperature ceramic fuel cells (LTCFCs),” *International journal of hydrogen energy, 37* (2012) 19417-19425.

Wedig, A., Merkle, R., Stuhlhofer, B., Habermeier, H.U., Maier, J. and Heifets, E. “Fast oxygen exchange kinetics of pore-free $Bi_{1-x}Sr_xFeO_{3-\delta}$ thin films,” *Physical Chemistry Chemical Physics, 13* (2011) 16530-16533.

Wei, F. Gasparyan, H. Keenan, P.J. Gutmann, M. Fang, Y. Baikie, T. Claridge, J.B. Slater, P.R., Kloc, C.L. and White, T.J. “Anisotropic oxide ion conduction in melilite intermediate temperature electrolytes,” *Journal of Materials Chemistry A, 3* (2015) 3091-3096.

West, A.R., *Basic solid state chemistry*, John Wiley & Sons Incorporated (1999).

Woolley, R.J. and Skinner, S.J. “Functionally graded composite $La_2NiO_{4+\delta}$ and $La_4Ni_3O_{10-\delta}$ solid oxide fuel cell cathodes,” *Solid State Ionics, 255* (2014) 1-5.

Wu, Y.C. and Lin, C.C. “The microstructures and property analysis of aliovalent cations (Sm^{3+}, Mg^{2+}, Ca^{2+}, S^{r2+}, Ba^{2+}) co-doped ceria-base electrolytes after an aging treatment,” *International journal of hydrogen energy, 39* (2014) 7988-8001.

Xia, C. Li, Y. Tian, Y. Liu, Q. Wang, Z. Jia, L. Zhao, Y. and Li, Y. "Intermediate temperature fuel cell with a doped ceria-carbonate composite electrolyte," *Journal of Power sources*, *195* (2010) 3149-3154.

Xia, C. Li, Y. Tian, Y. Liu, Q. Zhao, Y. Jia, L. and Li, Y. "A high performance composite ionic conducting electrolyte for intermediate temperature fuel cell and evidence for ternary ionic conduction," *Journal of Power Sources*, *188* (2009) 156-162.

Xiao, G. Liu, Q. Dong, X., Huang, K. and Chen, F "$Sr_2Fe_{4/3}Mo_{2/3}O_6$ as anodes for solid oxide fuel cells," *Journal of Power Sources*, *195* (2010) 8071-8074.

Xiao, G. Liu, Q. Wang, S. Komvokis, V.G. Amiridis, M.D. Heyden, A. Ma, S. and Chen, F. "Synthesis and characterization of Mo-doped $SrFeO_{3-\delta}$ as cathode materials for solid oxide fuel cells ," Journal of Power Sources 202 (2012) 63–69.

Xiao, G. Liu, Q. Zhao, F. Zhang, L. Xia, C. and Chen, F "$Sr_2Fe_{1.5}Mo_{0.5}O_6$ as cathodes for intermediate-temperature solid oxide fuel cells with $La_{0.8}Sr_{0.2}Ga_{0.87}Mg_{0.13}O_3$ electrolyte," *Journal of the Electrochemical Society*, *158* (2011) B455.

Xiaomin, L.I.N. Qiuyue, L.Ü. Lili, Z.H.U. and Xiaomei, L.I.U. " Synthesis and characterization of $Ce_{0.8}Sm_{0.2-x}Pr_xO_{2-\delta}$ (x=0.02–0.08) solid electrolyte materials," *Journal of Rare Earths*, *33* (2015) 411-416.

Xia, Y. Bai, Y. Wu, X. Zhou, D. Liu, X. and Meng, J. "The competitive ionic conductivities in functional composite electrolytes based on the series of M-NLCO (M= $Ce_{0.8}Sm_{0.2}O_{2-\delta}$, $Ce_{0.8}Gd_{0.2}O_{2-\delta}$, $Ce_{0.8}Y_{0.2}O_{2-\delta}$; NLCO=$0.53Li_2CO_3$–$0.47Na_2CO_3$)," *International journal of hydrogen energy*, *36* (2011) 6840-6850.

Xie, S., Liu, W., Wu, K., Yang, P.H., Meng, G.Y. and Chen, C.S. "Mixed oxygen ionic and electronic conduction in $CaFe_{0.2}Ti_{0.8}O_{3-\delta}$: a combined oxygen permeation and electrical conductivity study," *Solid State Ionics*, *118* (1999) 23-28.

Xu, X. Pan, Y. Zhou, W., Chen, Y., Zhang, Z. and Shao, Z. "Toward enhanced oxygen evolution on perovskite oxides synthesized from different approaches: a case study of $Ba_{0.5}Sr_{0.5}Co_{0.8}Fe_{0.2}O_{3-\delta}$. *Electrochimica Acta*, *219* 553-559.

Yahiro, H. Eguchi, K. and Arai, H. "Electrical properties and microstructure in the system ceria-alkaline earth oxide," *Journal of materials science, 23* (1988) 1036-1041.

Yamamoto, O. Arachi, Y. Sakai, H. Takeda, Y. Imanishi, N. Mizutani, Y. Kawai, M. and Nakamura, Y. "Zirconia based oxide ion conductors for solid oxide fuel cells". *Ionics, 4*(1998), 403-408.

Yamamoto, O. Arati, Y. Takeda, Y. Imanishi, N. Mizutani, Y. Kawai, M. and Nakamura, Y. "Electrical conductivity of stabilized zirconia with ytterbia and Scandia," *Solid State Ionics, 79* (1995) 137-142.

Yang, G. Su, C. Ran, R. Tade, M.O. and Shao, Z. "Advanced Symmetric Solid Oxide Fuel Cell with an Infiltrated K_2NiF_4-Type La_2NiO_4 Electrode," Energy & fuels 28 (2014) 356-362.

Yang, T.I. Brown, R.N. Kempel, L.C. and Kofinas, P. "Surfactant-modified nickel zinc iron oxide/polymer nanocomposites for radio frequency applications," *Journal of Nanoparticle Research, 12* (2010) 2967-2978.

Yano, M. Tomita, A. Sano, M. and Hibino, T. "Recent advances in single-chamber solid oxide fuel cells: a review," *Solid State Ionics, 177* (2007) 3351-3359.

Yao, C. Zhang, H. Dong, Y. Zhang, R. Meng, J. and Meng, F. "Characterization of Ta/W co-doped $SrFeO_{3-\delta}$ perovskite as cathode for solid oxide fuel cells," *Journal of Alloys and Compounds, 797* (2019) 205-212.

Yao, C. Zhang, H. Liu, X. Meng, J. Zhang, X. Meng, F. and Meng, J. "Investigation of layered perovskite $NdBa_{0.5}Sr_{0.25}Ca_{0.25}Co_2O_{5+\delta}$ as cathode for solid oxide fuel cells," Ceramics Int. 44 (2018), 12048-12054.

Yeh, T.H. Hsu, W.C. and Chou, C.C. “Mechanical and electrical properties of ZrO_2 (3Y) doped with $RENbO_4$ (RE = Yb, Er, Y, Dy, YNd, Sm, Nd) In *Journal de Physique IV* EDP sciences *(Proceedings)* 128 (2005) 213-219.

Yokokawa, H. Tu, H. Iwanschitz, B. and Mai, A.” Fundamental mechanisms limiting solid oxide fuel cell durability,” *Journal of Power Sources*, 182 (2008) 400-412.

Yoo, J. Verma, A. Wang, S. and Jacobson, A.J. “Oxygen Transport Kinetics in $SrFeO_{3-\delta}$, $La_{0.5}Sr_{0.5}FeO_{3-\delta}$, and $La_{0.2}Sr_{0.8}Cr_{0.2}Fe_{0.8}O_{3-\delta}$ Measured by Electrical Conductivity Relaxation,” *Journal of the Electrochemical Society*, *152* (2005) A497.

Younas, M., Atif, M., Nadeem, M., Siddique, M., Idrees, M. and Grossinger, R. “Colossal resistivity with diminished tangent loss in Zn–Ni ferrite nanoparticles,” *Journal of Physics D: Applied Physics*, *44* (2011) 345402.

Young, R.A. “*The Rietveld Method* ,” 5 (1993) 1-38.

Yu, X., Fan, J. and Xue, L. “Performance optimization of $SrFe_{0.95}Ti_{0.05}O_{3-\delta}$ cathode for intermediate temperature SOFC,” *Ceramics International*, *40* (2014) 13627-13634.

Yu, X., Long, W., Jin, F. and He, T. “Cobalt-free perovskite cathode materials $SrFe_{1-x}Ti_xO_{3-\delta}$ and performance optimization for intermediate-temperature solid oxide fuel cells,” *Electrochimica Acta*, *123* (2014) 426-434.

Zagaynov, I.V., Fedorov, S.V., Konovalov, A.A. and Antonova, O.S. “Perspective ceria-based solid solutions $Gd_xBi_{0.2-x}Ce_{0.8}O_2$,” *Materials Letters*, *203* (2017) 9-12.

Zając, W., Suescun, L., Świerczek, K. and Molenda, J. “Structural and electrical properties of grain boundaries in $Ce_{0.85}Gd_{0.15}O_{1.925}$ solid electrolyte modified by addition of transition metal ions,” *Journal of Power Sources*, *194* (2009) 2-9.

Zhang, C. Sunarso, J. Zhu, Z. Wang, S. and Liu, S. “Enhanced oxygen permeability and electronic conductivity of $Ce_{0.8}Gd_{0.2}O_{2-\delta}$ membrane via the addition of sintering aids,” *Solid State Ionics*, *310* (2017)121-128.

Zhang, G. Li, W. Huang, W. Cao, Z. Shao, K. Li, F. Tang, C. Li, C. He, C. Zhang, Q. and Yang, W. Hong, T. Li, S. Ma, Z. Sun, C. Xia, C. and Chen, L. "Perovskite Sr_{1-x} Ce_x $CoO_{3-\delta}$ ($0.05 \leq x \leq 0.15$) as Superior Cathodes for Intermediate Temperature Solid Oxide Fuel Cells. *ACS applied materials & interfaces, 5* (2013) 1143-1148.

Zhang, H. Wang, J. Wang, S.C. and Li, Z.C."Conductivity of cerium oxides doped by trivalent cations," *Transactions of Nonferrous Metals Society of China, 17* (2007) s565-s569.

Zhang, K. Ge, L. Ran, R. Shao, Z. and Liu, S. "Synthesis, characterization and evaluation of cation-ordered $LnBaCo_2O_{5+\delta}$ as materials of oygen permeation membranes and cathodes of SOFCs," *Acta Materialia, 56* (2008) 4876-4889.

Zhang, L. Li, X. Wang, S. Romito, K.G. and Huang, K. "High conductivity mixed oxide-ion and carbonate-ion conductors supported by a prefabricated porous solid-oxide matrix," *Electrochemistry communications, 13* (2011) 554-557.

Zhang, L. Zhou, Q. He, Q. and He, T. "Double-perovskites $A_2FeMoO_{6-\delta}$ (A= Ca, Sr, Ba) as anodes for solid oxide fuel cells," *Journal of Power sources, 195* (2010) 6356-6366.

Zhang, T.S. Ma, J. Kong, L.B. Chan, S.H. Hing, P. and Kilner, J.A. "Iron oxide as an effective sintering aid and a grain boundary scavenger for ceria-based electrolytes," *Solid State Ionics, 167* (2004) 203-207.

Zhang, T. Kong, L. Zeng, Z. Huang, H. Hing, P. Xia, Z. and Kilner, J. "Sintering behavior and ionic conductivity of $Ce_{0.8}Gd_{0.2}O_{1.9}$ with a small amount of MnO_2 doping.,"*Journal of solid state electrochemistry, 7* (2003), 348-354.

Zhang, Y. Knibbe, R. Sunarso, J. Zhong, Y. Zhou, W. Shao, Z. and Zhu, Z. "Recent progress on advanced materials for solid-oxide fuel cells operating below 500° C," Adv. Mater.29 (2017) 1700132.

Zhao, Y. Xia, C. Xu, Z. and Li, Y. "Validation of H^+/O^{2-} conduction in doped ceria–carbonate composite material using an electrochemical pumping method," *International journal of hydrogen energy, 37* (2012) 11378-11382.

Zheng, H. Weng, W. Han, G. and Du, P. "Colossal permittivity and variable-range-hopping conduction of polarons in $Ni_{0.5}Zn_{0.5}Fe_2O_4$ ceramic," *The Journal of Physical Chemistry C, 117* (2013) 12966-12972.

Zhou, D.F. Xia, Y.J. Zhu, J.X. and Meng, J." Preparation and electrical properties of new oxide ion conductors $Ce_{6-x}DyxMoO_{15-\delta}$ ($0.0 \leq x \leq 1.8$)," *Solid state sciences, 11* (2009) 1587-1591.

Zhou, W., Sunarso, J., Zhao, M., Liang, F., Klande, T. and Feldhoff, A., " A highly active perovskite electrode for the oxygen reduction reaction below 600 C," *Angewandte Chemie International Edition, 52* (2013) 14036-14040.

Zhou, Y. Meng, X. Liu, X. Pan, X. Li, J. Ye, X. Nie, H. Xia, C. Wang, S. and Zhan, Z., "Novel architectured metal-supported solid oxide fuel cells with Mo-doped $SrFeO_{3-\delta}$ electrocatalysts," *Journal of Power Sources, 267* (2014) 148-154.

Zhu, B. "Next generation fuel cell R&D," *International journal of energy research, 30* (2006) 895-903.

Zhu, B. Li, S. and Mellander, B.E." Theoretical approach on ceria-based two-phase electrolytes for low temperature (300–600°C) solid oxide fuel cells," *Electrochemistry Communications, 10* (2008) 302-305.

Zhu, B. Liu, X. Zhou, P. Yang, X. Zhu, Z. and Zhu, W. "Innovative solid carbonate–ceria composite electrolyte fuel cells," *Electrochemistry communications, 3* (2001) 566-571.

Zhu, B. and Mat, M.D." Studies on dual phase ceria-based composites in electrochemistry," *Int. J. Electrochem. Sci, 1* (2006) 383-402.

Zhu, B. Yang, X.T. Xu, J. Zhu, Z.G. Ji, S.J. Sun, M.T. and Sun, J.C. “Innovative low temperature SOFCs and advanced materials,” *Journal of Power Sources*, *118* (2003) 47-53.

Zhu, Z. Wei, Z. Zhao, Y. Chen, M. and Wang, S. “Properties characterization of tungsten doped strontium ferrites as cathode materials for intermediate temperature solid oxide fuel cells,” *Electrochimica Acta*, *250* (2017) 203-211.

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List of publications during Ph.D.

International Journals.

1. **Monika Singh**, Akhilesh Kumar Singh. Studies on structural, morphological, and electrical properties of Ga^{3+} and Cu^{2+} co-doped ceria ceramics as solid electrolyte for IT-SOFCs. Int. J. Hydrogen Energy. 2019; 45 (44) 24014-24025. https://doi.org/10.1016/j.ijhydene.2019.09.084.

2. **Monika Singh**, Uday Pratap Azad, Sourav Ghosh, Ashish Kumar Singh, Vellaichamy Ganesan, Akhilesh Kumar Singh, Rajiv Prakash. Facile synthesis of BSCF perovskite oxide as an efficient bifunctional oxygen electro catalyst. Int. J. Hydrogen Energy.2018; 43 (45) 20671-20679. https://doi.org/10.1016/j.ijhydene.2018.09.134.

3. **Monika Singh**, Akhilesh Kumar Singh. Space Charge Layer Induced Superionic Conduction and Charge Transport behaviour of "Alkali Carbonates and tri-doped Ceria Nanocomposites" for LT-SOFCs Applications"Ceramics International 2020 1 (47) 1218-1228. https://doi.org/10.1016/j.ceramint.2020.08.241.

4. **Monika Singh**, Akhilesh Kumar Singh. Cobalt free $SrFe_{0.8}Mo_{0.1}W_{0.1}O_{3-\delta}$ perovskite structured cathode for SOFCs application. (to be communicated in Materials Chemistry and Physics).

5. Vinita, Madhu Tiwari, Neha Agnihotri, **Monika Singh**, Akhilesh Kumar Singh, and Rajiv Prakash. Nano-network of Coordination Polymer AHMT-Ag for the Effective and Broad Spectrum Detection of 6-Mercaptopurine in Urine and Blood Serum ACS Omega 2019; 4(16)16733-16742 https://doi.org/10.1021/acsomega.9b01122.

6. **Monika Singh**, Sachin Kumar, Raj Pal, Uday P Azad, Divya P Singh, Vellaichamy Ganesan, Akhilesh K Singh, Rajiv Prakash, Lanthanide Based Double Perovskites: Bifunctional Catalysts for Oxygen Evolution/Reduction Reactions Int. J. Hydrogen Energy 2021;33(46)17163-17172. https://doi.org/10.1016/j.ijhydene.2021.02.141.

Conference proceedings

7. **Monika Singh**, Dinesh Kumar, Akhilesh Kumar Singh. Synthesis and structural study of cerium substituted $La_{0.4}Ca_{0.6}MnO_3$ solid oxide fuel cell electrode material, AIP conference proceedings. **1942**, 140068 (2018); https://doi.org/10.1063/1.5029199.

8. Dinesh Kumar, **Monika Singh**, Akhilesh Kumar Singh. Crystallite size effect on lattice strain and crystal structure of $Ba_{0.25}Sr_{0.75}MnO_3$ layered perovskite mangnite, AIP conference proceedings. **1953**, 030185 (2018); https://doi.org/10.1063/1.5032520.

9. **Monika Singh**, Pragyanand Prajapati, Akhilesh Kumar Singh. Developing a reduction resistant layer with $SrNi_{0.8}Mo_{0.2}O_{3-x}$ mixed–oxide for $Sm_{0.2}Ce_{0.8}O_{2-x}$ based Solid Oxide Fuel Cells, AIP conference proceedings **2115**, 030622 (2019); https://doi.org/10.1063/1.5113461.

10. **Monika Singh**, Vijayeta pal, Akhilesh Kumar Singh. Investigation of Dielectric Relaxation and ion Dynamics of $Ce_{0.76}Pr_{0.08}Sm_{0.08}Gd_{0.08}O_{2-x}$ nanocrystalline Solid Electrolyte ion conductor material today proceedings.2020; 20(1)317-319 https://doi.org/10.1016/j.matpr.2020.02.174.

11. Vijayeta pal, **Monika Singh**, Akhilesh Kumar Singh. Structural and Large Electric Field-Induced Bipolar Strain Study of Lead Free $Bi_{0.5}Na_{0.5}TiO_3$: Gd Piezoceramics material today proceedings 2020; 20(1) 328-331. https://doi.org/10.1016/j.matpr.2020.02.178.

List of Conferences/Symposiums attended during Ph.D.

1. International conference on technologically advanced materials and Asian meeting on Ferro electricity, 07^{th} -11^{th} Nov 2016 (Organized by University of Delhi).

2. Silver Jubilee conference on study of matter using intense radiation sources and under extreme conditions, 03^{rd} -06^{th} Nov 2016, held at UGC-DAE Indore.

3. 62^{nd} DAE Solid state physics symposium, 26^{th} -30^{th} Dec 2017, Organized by BARC-Mumbai.

4. International Conference on "Nanoscience and Life" organized by Prof. O. N. Srivastava, Department of Physics, Banaras Hindu University, Varanasi,

5. 45th National Seminar on Crystallography organized by School of Materials Science and Technology, Indian Institute of Technology (Banaras Hindu University), Varanasi during 9-12 July, 2017.

6. Institute day organized by IIT BHU during April 4-6, 2018. (Poster presentation)

7. The 3^{rd} National Conference on Materials for Energy Conversion and Storage organized by SMST IIT BHU during October 18-20, 2018.

8. International conference on Materials for Energy Applications (ICME-18) organized by S.S. Jain Subodh P.G. College Jaipur during December 6-8, 2018. (Oral Presentation)

9. First Indian Materials Conclave & 30th Annual General Meeting of Materials Research Society of India (MRSI) organized by Materials Research Society of India and Indian Institute of Science, Bangalore during February 12-15,2019.

10. International webinar on Ceramics and Composite Materials 2020, June 7, 2020 (Speaker)

11. 6th International Conference on Nanoscience and Nanotechnology organized by Department of Physics and Nanotechnology, SRM Institute of Science and Technology (SRMIST), February 01 - 03, 2021, (Virtual Conference)

Workshop attended

1. Five-days workshop on "Nanochemistry: From pre-organized Molecular Architectures to Functional Materials" under Global Initiative of Academic Networks (GIAN) scheme of MHRD organized by IIT BHU (Chemistry) during 19th December to 23th December 2016.

2. National Workshop on High P-T Techniques for Material Synthesis and Characterization Organized by National Centre of Experimental Mineralogy and Petrology (NCEMP), University of Allahabad, Allahabad-211004 during November 23-29, 2015.