

## References

- AEO, (2009), *Annual Energy Outlook, 2009*
- AER, (2011), *Annual Energy Review: 2011*, U. S. Energy Information Administration, USA
- Alcantara,R., Jaraba,M., Lavela,P., Lioris,J.M., Vicent,C.P., Tirado,J.L., (2005), "Synergistic Effects of Double Substitution in  $\text{LiNi}_{0.5-y}\text{Fe}_y\text{Mn}_{1.5}\text{O}_4$  Spinel as 5 V Cathode Materials", *J. Electrochem. Soc.*, Vol. 152, issue 1, pp. A13-A18, January 2005
- Aneke,M., and Wang,M., (2016), "Energy storage technologies and real life applications - A state of the art review", *Applied Energy*, 179, pp. 350-377, Jun 2016
- Antolini,E., (2004), "LiCoO<sub>2</sub>: formation, structure, lithium and oxygen nonstoichiometry, electrochemical behaviour and transport properties", *Solid State Ionics*, Vol. 170, issues 3-4, pp. 159-171, May 2004
- Aoshima,T., Okahara,K., Kiyohara,C., Shizua,K., (2001), "Mechanisms of manganese spinels dissolution and capacity fade at high temperature", *J. Power Sources*, Vol. 97-98, pp. 377-380, July 2001
- Armstrong,A.R., Paterson,A.J., Robertson,A.D., Bruce,P.G., (2002), "Nonstoichiometric Layered  $\text{Li}_x\text{Mn}_y\text{O}_2$  with a High Capacity for Lithium Intercalation/Deintercalation", *Chemistry of Materials*, Vol. 14, issue 2, pp. 710-719, January 2002
- Arumugam,D., Kalaignan,G.P., (2008), "Synthesis and electrochemical characterizations of Nano-SiO<sub>2</sub>-coated  $\text{LiMn}_2\text{O}_4$  cathode materials for rechargeable lithium batteries", *J. Electroanal. Chem.*, Vol. 624, issue 1-2, pp. 197-204, December 2008
- Arumugam,D., Paruthimal,K.G., Manisankar,P., (2008), "Development of structural stability and the electrochemical performances of 'La' substituted spinel  $\text{LiMn}_2\text{O}_4$  cathode materials for rechargeable lithium-ion batteries", *Solid State Ionics*, 179, 580-586, April 2008
- Arumugam,D., Paruthimal K.G., (2010), "Synthesis and electrochemical characterizations of nano size Ce doped  $\text{LiMn}_2\text{O}_4$  cathode materials for rechargeable lithium batteries", *J. Electroanal. Chem.*, Vol. 648, pp. 54-59, June 2010
- Autosorb, (2016), Operating Manual: ASiQwin gas sorption system, Model 6, ASiQWin, Part Number 05098-5.00, Rev A © 2009-2016, Quantachrome Instruments, FL 33426, USA
- Azhar,I., Iqbal,Y., Chang,L., Ahmed,S., Tang,Z., Gao,Y., (2012), "Enhanced electrochemical performance of La- and Zn-co-doped  $\text{LiMn}_2\text{O}_4$  spinel as the cathode material for lithium-ion batteries", *J. Nanopart Res*, Vol. 14, issue 10, pp.1206, October 2012
- Bakierska,M., Molenda,M., Dziembaj,R., (2014), "Optimization of Sulphur Content in  $\text{LiMn}_2\text{O}_{4-y}\text{S}_y$  Spinel as Cathode Materials for Lithium-ion Batteries", *Procedia Engineering*, Vol. 98, pp. 20-27, Jun 2014
- Balaji,S., Chandran,T.M., Mutharasu,D., (2012), "A study on the influence on influence of  $\text{Nd}^{3+}$  substitution on properties of  $\text{LiMn}_2\text{O}_4$ ", *Bull. Mater. Sci.*, Vol. 35, No. 3, pp. 471-480, June 2012
- Balaji,S., Manichandran,T., Mutharasu,D., (2012), "A study on the influence of Dysprosium cation substitution on the structural, morphological, and electrochemical properties of lithium manganese oxide", *Ionics*, Vol. 18, issue 6, pp. 549-558, June 2012
- Balaji,S.R.K., Mutharasu,D., Shanmugan,S., Subramanian,N.S., Ramanathan,K., (2010), "Influence of  $\text{Sm}^{+3}$  ion in structural, morphological, and electrochemical properties of  $\text{LiMn}_2\text{O}_4$  synthesized by microwave calcination", *Ionics*, Vol. 16, issue 4, pp. 351-360, May 2010
- Bao,S.-J., Liang,Yan-Yu, Zhou,W.-J, He,B.L., Li,H.-L., (2005), "Enhancement of the electrochemical properties of  $\text{LiMn}_2\text{O}_4$  through  $\text{Al}^{3+}$  and F-co-substitution", *J. Colloid Interface Sci.*, Vol. 291, issue 2, pp. 433-437, November 2005
- Bossche,P.V.D., Vergels,F., Mierlo,J.V., Matheys,J., Autenboer,W.V., (2006), "SUBAT: An assessment of sustainable battery technology", *J. Power Sources*, Vol. 162, issue 2, pp. 913-919, November 2006
- BST8, "Operating Manual: BST8 seires Eight Channel Battery Analyzer", MTI corporation, CA 94804, USA
- Capsoni,D., Bini,M., Chioldelli,G., Mustarelli,P., MAssaritti,V., Azzoni,C.B., Mozzati,M.C., Linati,L., (2002), "Inhibition of Jahn-Teller Cooperative Distortion in  $\text{LiMn}_2\text{O}_4$  Spinel by  $\text{Ga}^{3+}$  Doping", *J. Phys. Chem. B*, Vol. 106, issue 30, pp. 7432-7438, July 2002
- Chae,J.S., Jo,M.R., Kim,Y.-II., Han,D.-W., Park,S.-M., Kang,Y.-M., Roh,C., (2015), "Kinetic favorability of Ru-doped  $\text{LiNi}_{0.5}\text{Mn}_{1.5}\text{O}_4$  for high-power lithium-ion batteries", *J. Industrial and Engineering Chemistry*, Vol. 21, pp. 731-735, January 2015

- Chen,H., Cong,T.N., Yang,W., Tan,C., Li,Y., Ding,Y., (2009), "Progress in electrical energy storage system: A critical review", *Progress in Natural Science*, Vol. 19, issue 3, pp. 291-312, March 2009
- Chen,R., Zhao,T., Zhang,X., Li L., Wu,F., (2016), "Advanced cathode materials for lithium-ion batteries using nano-architectonics", *Nanoscale Horiz.*, Vol. 1, pp. 423-444, May 2016
- Cho,J., and Thackeray,M.M., (1999), "Structural Changes of  $\text{LiMn}_2\text{O}_4$  spinel electrodes during electrochemical cycling", *J. Electrochem.Soc.*, Vol. 146, issue 10, pp. 3577-3581, April, 1999
- Cho,J., Kim,Y.-W., Kim,B., Lee, J.-G., Park,B., (2003), "A breakthrough in the safety of Lithium secondary batteries by coating the cathode material with  $\text{AlPO}_4$  nanoparticles", *Angewandte Chemie International Edition*, Vol. 42, Issue 14, pp. 1618-1621, April 2003
- Dziembaj,R., and Molenda,M., (2003), "Stabilization of the spinel structure in  $\text{Li}_{1+\delta}\text{Mn}_{2-\delta}\text{O}_4$  obtained by sol-gel method", *J. Power Sources*, Vol. 119-121, pp. 121-124, Jun 2003
- Ebin,B., Lindbergh,G., and Gurmen,S., (2014), "Preparation and electrochemical properties of nanocrystalline  $\text{LiB}_x\text{Mn}_{2-x}\text{O}_4$  cathode particles for Li-ion batteries by ultrasonic spray pyrolysis method", *J. Alloys Compd.*, Vol. 620, pp. 399-406, October 2014
- Eftekhari,A., Moghaddam,A.B., Hashjin,M.S., (2006), "Electrochemical properties of  $\text{LiMn}_2\text{O}_4$  cathode material doped with an actinide", *J. Alloy Compond.*, Vol. 424, issues 1-2, pp. 225-230, November 2006
- Ein-Eli,Y., Urian,R.C., Wen,W., Mukerjee,S., (2005), "Low temperature performance of copper/nickel modified  $\text{LiMn}_2\text{O}_4$  spinels", *Electrochim. Acta.*, Vol. 50, issue 9, pp. 1931-1937, March 2005
- EVO, (2008), "SEM operator user guide: EVO® MA and LS series,", Carl Zeiss SMT Ltd., Cambridge, England, 2008
- Fan,X.-F., Zhao,S.-X., Li,L., Nan,C.W., (2012), "Structure and Electrochemical Performance of Modified  $\text{LiMn}_2\text{O}_4$  by S-Co codoping and Nano  $\text{SiO}_2$  Surface Coating", *Materials Science Forum*, Vol. 722, pp 1-9, June 2012
- Feng,Q., Kanoh,H., Miyai,Y., Ooi,K., (1995), "Hydrothermal synthesis of Lithium and sodium manganese oxides and their metal ion extraction/insertion reactions", *Chem. Mater.*, Vol. 7, issue 6, pp. 1226-1232, Jun 1995
- Gadveja,H., Gorova,M., Kotzeva,V., Avdeev,G., Uzunova,S., Ovacheva,D., (2004), " $\text{LiMn}_2\text{O}_4$  prepared by different methods at identical thermal treatment conditions: structural, morphological and electrochemical characteristics", *J. Power Sources*, Vol. 134, issue 1, pp. 110-117, July 2004
- Gao,Y., and Dhan,J.R., (1996), "Synthesis and characterization of  $\text{Li}_{1+x}\text{Mn}_{2-x}\text{O}_4$  for Li-ion Battery Application", *J. Electrochem. Soc.*, Vol. 143, issue 1, pp. 100-114, January 1996
- Gnanaraj,J.S., Pol,V.G., Gedanken,A., Aurbach D., 2003, "Improving the high-temperature performance of  $\text{LiMn}_2\text{O}_4$  spinel electrodes by coating the active mass with  $\text{MgO}$  via a sonochemical method", *J. Electrochem. Commun.*, Vol. 5, issue 11, pp.940-945, November 2003
- Goodenough,B.J., Kim,Youngsik, (2009), "Challenges for Rechargeable Li Batteries", *Chem. Mater.*, Vol. 22, issue 3, pp. 587-603, August 2009
- Gummow,R.J., Kock,A.D., Thackeray,M.M., (1994), "Improved capacity retention in rechargeable 4 V lithium/lithium-manganese oxide (spinel) cells" *Solid State Ionics*, Vol. 69, issue 1, pp. 59-67, April 1994
- Guyomard,D., Tarascon,J.M., (1994), "The carbon/ $\text{Li}_{1+x}\text{Mn}_2\text{O}_4$  system", *Solid State Ionics*, Vol. 69, pp. 222-237, August 1994
- Han,S.C., Singh,S.P., Hwang,Y.-H., Bae,E.G., Park,B.K., Sohn,K.-S., Pyo,M., (2012), "Gadolinium-doped  $\text{LiMn}_2\text{O}_4$  cathodes in Li-ion vatteries: Understanding the stabilized structure and enhanced electrochemical kinetics", *J. Electrochem. Soc.*, Vol. 159, issue 11, pp. A1867-A1873, November 2012
- Han,Y.-S., and Kim,H.-G., (2000), "Synthesis of  $\text{LiMn}_2\text{O}_4$  by modified Pechini method and characterization as a cathode for rechargeable Li/ $\text{LiMn}_2\text{O}_4$  cells", *J. Power Sources*, Vol. 88, issue 2, pp. 161-168, June 2000
- He,X., Li,J., Cai,Y., Wang,Y., Ying,J., Jiang,C., Wan,C., (2005), "Fluorine doping of spherical spinel  $\text{LiMn}_2\text{O}_4$ ", *Solid State Ionics*, Vol. 176, issue 35-36, pp. 2571-2576, November 2005
- Helan,M., Berchmans,L.J., Jose,P.T., Visuvasam,A., Angappan,S., (2010), " Molten salt synthesis of  $\text{LiMn}_2\text{O}_4$  using chloride-carbonate melt", *Mater. Chem. Phys.*, Vol. 124, issue 1, pp. 439-442, November 2010.
- Helan,M., Berchmans,L.J., Kumari,V.S.S., Ravisankar,R., Shanmugam,V.M., (2013), " Molten salt synthesis of  $\text{LiGd}_{0.01}\text{Mn}_{1.99}\text{O}_4$  using chloride-carbonate melt", *Materials Research Innovations*, Vol. 15, issue 2, pp. 130-134, November 2013
- Hong,E.-S., Okada,S., Sonoda,T., Gopukumar,S., Yamak,J.-I., (2004), "Thermal stability of electrolytes with mixtures of  $\text{LiPF}_6$  and  $\text{LiBF}_4$  used in lithium-ion cells", *J. Electrochem. Soc.*, Vol. 151, issue 11, pp. A1836-A1840, November 2004

- Hu,L., Shao,M., Guo,J., Su,C.W., Peng,P., (2016), "The Electrochemical Performance of  $\text{LiMn}_{1.96}\text{Mg}_{0.04}\text{O}_4$  cathode material prepared by solid-state combustion method", *Int. J. Electrochem. Sci.*, Vol. 11, issue 11, pp. 9123-9132, November 2016
- Hu,S., Li,Y., Yin,J., Wang,H., Yuan,X., Li,Q., (2014), "Effect of different binders on electrochemical properties of  $\text{LiFePO}_4/\text{C}$  cathode material in lithium ion batteries", *Chem. Eng. J.*, Vol. 237, pp. 497-502, February 2014
- Hung,F.-Y., Lui,T.-S., Liao,H.-C., (2007), "A study of nano-sized surface coating on  $\text{LiMn}_2\text{O}_4$  materials", *J. Appl. Surf. Sci.*, Vol. 253, issue 18, pp. 7443-7448, July 2007
- Hwang,B.J., Santhanam,R., Liu,D.J., (2001), "Characterization of nanoparticles of  $\text{LiMn}_2\text{O}_4$  synthesized by citric acid sol-gel method", *J. Power Sources*, Vol. 97-98, pp. 443-446, July 2001
- Hwang,W.-T., Um,W.-S., Lee,H.-S., Song,J.-K., Chung,K.-W., (1998), "Powder synthesis and electrochemical properties of  $\text{LiMn}_2\text{O}_4$  prepared by emulsion-drying method", *J. Power Sources*, Vol. 74, issue 2, pp.169-174, August 1998
- Ilango,P.R., Prasanna,K., Subburaj,T., Jo,Y.-N., Lee,C.W., (2015), "Facile longitudinal unzipping of carbon nanotubes to graphene nanoribbons and their effects on  $\text{LiMn}_2\text{O}_4$  cathodes in rechargeable lithium-ion batteries", *Acta Materialia*, Vol. 100, pp. 11-18, November 2015
- INCA, (2006), "Operating Manual: INCA Energy", issue 2.1, Oxford Instruments Analytical, UK, January 2006
- Inoue,T., and Sano,M., (1998), "An investigation of capacity fading of manganese spinels stored at elevated temperature", *J. Electrochem. Soc.*, Vol. 145, issue 11, pp. 3704-3707, November 1998
- Jang,D.H., Shin,Y.J., Oh,S.M., (1996), "Dissolution of spinel oxides and capacity losses in 4 V  $\text{Li} / \text{Li}_x\text{Mn}_2\text{O}_4$  cells", *J. Electrochem. Soc.*, Vol. 143, issue 7, pp. 2204-2211, November 1996
- Jang,M.-W., Jung,H.-G.,Scrosati,B., Sun,Y.-K., (2012), "Improved Co-substituted,  $\text{LiNi}_{0.5-x}\text{Co}_2\text{Mn}_{1.5-x}\text{O}_4$  lithium ion battery cathode materials", *J. Power Sources*, Vol. 220, pp. 354-359, December 2012
- Jin,Y.-Z., Lv,Y.Z., Xue,Y., Wu,J., Zhang,X.-G., Wang,Z.-B., (2014), "Improved electrochemical performance of  $\text{LiNi}_{0.4}\text{Ti}_{0.1}\text{Mn}_{1.5}\text{O}_4$  as cathode of lithium ion battery by carbon-coating", *RSC Advances*, Vol. 4, issue 100, pp. 57041-57047, October 2014
- Julien,C.M., and Massot ,M., (2003), "Lattice vibrations of materials for lithium rechargeable batteries I. Lithium manganese oxide spinel", *Mater. Sci. Eng. B*, Vol. 97, issue 3, pp. 217-230, February 2003
- Julien,C.M., Mauger,A., Zaghib,K., Groult,H., (2014), "Comparative issues on cathode materials for Li-ion Batteries", *Inorganics*, Vol. 2, issue 1, pp. 132-154, March 2014
- Kanamura,K., Dokko,K., Kaizawa,T., (2005), "Synthesis of spinel  $\text{LiMn}_2\text{O}_4$  by a hydrothermal Process in supercritical water with heat-treatment", *J. Electrochem. Soc.*, Vol. 152, issue 2, pp. A391-A395, January 2005
- Kawai,H., Nagata,M., Tukamoto,H., West,A.R., (1998), "A novel cathode  $\text{Li}_2\text{CoMn}_3\text{O}_8$  for lithium ion batteries operating over 5 volts " *J. Mater. Chem.*, Vol. 8, issue 4, pp. 837-839, April 1998
- Kim,J.-S., Johnson,C.S., Vaughey,J.T., Hackney,S.A., Walz,K.A., Zeltner,W.A., Anderson,M.A., Thackeray,M.M., (2004), "The Electrochemical stability of spinel electrodes coated with  $\text{ZrO}_2$ ,  $\text{Al}_2\text{O}_3$  and  $\text{SiO}_2$  from colloidal suspensions", *J. Electrochem. Soc.*, Vol. 151, issue 10, pp. A1755-A1761, October 2004
- Kim,M.C., Nam,K-W., Hu,E., Yang,X.-Q., im,H., Kang,K., Aravindan,V., Kim, W-S., Lee,Y-S., (2014), "Sol-Gel Synthesis of Aliovalent Vanadium-Doped  $\text{LiNi}_{0.5}\text{Mn}_{1.5}\text{O}_4$  Cathodes with Excellent Performance at High Temperatures", *Chem. Sus. Chem.*, Vol. issue 3, pp. 829-834, January 2014
- Kitamura,N., Iwatsuki,H., Idemoto,Y., (2009), "Improvement of cathode performance of  $\text{LiMn}_2\text{O}_4$  as a cathode active material for Li ion battery by step-by-step supersonic-wave treatments", *J. Power Sources*, Vol. 189, issue 1, pp. 114-120, April 2009
- Kittel C., (1996), *Introduction to solid state physics*, 7<sup>th</sup> edition, John Wiley and Sons, Singapore
- Kovacheva,D., Gadjov,H., Petrov,K., Mandal,S., Lazarraga,M.G., Pascual,L., Amarilla,J.M., Rojas,R.M., Herrero,P., Rojo,J.M., (2002), "Synthesizing nanocrystalline  $\text{LiMn}_2\text{O}_4$  by a combustion route", *J. Mater.Chem.*, Vol. 12, pp. 1184-1188
- Lafont,U., Locati,C., Borghols,J.H., Lasinska,A., Dygas,J., Chadwick,A.V., (2009), "Nanosized high voltage cathode material  $\text{LiMg}_{0.05}\text{Ni}_{0.45}\text{Mn}_{1.5}\text{O}_4$ : Structural, electrochemical and in situ investigation", *J. Power Sources*, Vol. 189, issue 1, pp. 179-184, April 2009
- Lea,T.V., Lec,M.L.P., Tranc,M.V., Nguyenb.N.M.T., Luua,A.T., Nguyen,H.T., (2015), "Fabrication of cathode materials based on  $\text{LiMn}_2\text{O}_4 / \text{Cnt}$  and  $\text{LiNi}_{0.5}\text{Mn}_{1.5}\text{O}_4 / \text{Cnt}$  nanocomposites for Lithium - ion batteries application", *Mat. Res.*, Vol. 18, No. 5, pp. 1044-1052, September-October 2015

- Lee, D.K., Han, S.C., Ahn, D., Singh, S.P., Sohn, K.-S., Pyo, M., (2012), "Suppression of phase transition in  $\text{LiTb}_{0.01}\text{Mn}_{1.99}\text{O}_4$  cathodes with fast  $\text{Li}^+$ -ion diffusion" *ACS Appl. Mater. Interfaces*, Vol. 4, issue 12, pp.6842-6848, November 2012
- Lee, S.-W., Kim, K.-S., Moon, H.-S., Kim, H.-J., Cho, B.-W., Cho, W.-I., Ju, J.-B., Park, J.-W., (2004), Electrochemical characteristics of  $\text{Al}_2\text{O}_3$ -coated lithium manganese spinel as a cathode material for a lithium secondary battery", *J. Power Sources*, Vol. 126, issue 1-2, pp. 150-155, February 2004
- Li, J., Baggetto, L., Martha, S.K., Veith, G.M., Nanda, J., Liang, C., Dudney, N.J., (2013), "An artificial solid electrolyte interphase enables the use of a  $\text{LiNi}_{0.5}\text{Mn}_{1.5}\text{O}_4$  5V cathode with conventional electrolytes", *Advanced Energy Materials*, Vol. 3, issue 10, pp. 1275-1278, October 2013
- Li, Q., Peng, C., Huang, J., Xu, W., Yang, F., Bai, H., Su, C., Guo, J., (2015), "Preparation and electrochemical properties of  $\text{LiMn}_2\text{O}_4$  by solid-state combustion synthesis method using starch as a fuel", *Int. J. Electrochem. Sci.*, Vol. 10, issue 9, pp. 7513-7520, September 2015
- Li, X., Xu, Y., Wang, C., (2009), "Suppression of Jahn-Teller distortion of spinel  $\text{LiMn}_2\text{O}_4$  cathode", *J. Alloy. Compd.*, Vol. 479, issue 1-2, pp. 310-313, June 2009
- Liang, Y.-Y., Bao, S.-J., and Li, H.-L., (2006), "A series of spinel phase cathode materials prepared by a simple hydrothermal process for rechargeable lithium batteries", *J. Solid State Chemistry*, Vol. 179, issue 7, pp. 2133-2140, July 2006
- Lim, S., and Cho, J., (2008), "PVP-functionalized nanometer scale metal oxide coatings for cathode materials: successful application to  $\text{LiMn}_2\text{O}_4$  spinel nanoparticle", *Chem. Commun.*, issue 37, pp. 4472-4474, October 2008
- Lin, M., Wang, S.H., Gong, Z.L., Huang, X.K., Yang, Y., (2013), "A strategy to improve cyclic performance of  $\text{LiNi}_{0.5}\text{Mn}_{1.5}\text{O}_4$  in a wide voltage region by Ti-doping", *J. Electrochem. Soc.*, Vol. 160, issue 5, pp. A3036-A3040, March 2013
- Linden, D., and Reddy, T.B., 2002, *Handbook of Batteries*, 3<sup>rd</sup> edition, McGraw-Hill, New Delhi
- Liu, D., Liu, X., He, Z., (2007), "Surface modification by ZnO coating for improving the elevated temperature performance of  $\text{LiMn}_2\text{O}_4$ ", *J. Alloy. Compd.*, Vol. 436, issue 1-2, pp. 387-391, June 2007
- Liu, H., Song, L., Zhang, K., (2005) "Er-Doped  $\text{LiMn}_2\text{O}_4$ ", *Inorg. Mater.*, Vol. 41, issue 6, pp. 646-649, June 2005
- Liu, H.W., Zhang, K.L., (2004), "The synthesis and cycling behaviour of  $\text{LiEr}_x\text{Mn}_{2-x}\text{O}_4$  for lithium-ion batteries", *Materials Letters*, Vol. 58, Issue 24, pp. 3049-3051, September 2004
- Liu, J., and A. Manthiram, A., (2009), "Understanding the improved electrochemical performances of Fe-substituted 5 V spinel cathode  $\text{LiMn}_{1.5}\text{Ni}_{0.5}\text{O}_4$ ", *J. Phys. Chem. C*, Vol. 113, issue 33, pp. 15073-15079, August 2009
- Liu, W., Farrington, G.C., Chaput, F., Dunn, B., (1996), "Synthesis and electrochemical studies of spinel phase  $\text{LiMn}_2\text{O}_4$  cathode materials prepared by the pechini process" *J. Electrochem. Soc.*, Vol. 143, issue 3, pp. 879-884, March 1996
- Liu, Z., Han, L., and Mo, Y., (2012), "Raman spectroscopy study of in situ change in laser irradiated  $\text{LiMn}_2\text{O}_4$ ", *Chin. Opt. Lett.*, vol. 10, issue 8, pp. 083001, August 2012
- Ma, J., Hu, P., Cui, G.L., Chen, L.Q., (2016), "Surface and interface issues in spinel  $\text{LiNi}_{0.5}\text{Mn}_{1.5}\text{O}_4$ : insights into a potential cathode material for high energy density lithium ion batteries", *Chem. Mater.*, Vol. 28, issue 11, pp. 3578-3606, Jun 2016
- Manev, V., Banov, B., Momchilov, A., Nassalevska, A., (1995), " $\text{LiMn}_2\text{O}_4$  for 4V lithium-ion batteries", *J. power sources*, Vol. 57, issues 1-2, pp. 99-103, September-December 1995
- Manthiram, A., Chemelewski, K., Lee, E.-S., (2014), "A perspective on the high-voltage  $\text{LiNi}_{0.5}\text{Mn}_{1.5}\text{O}_4$  spinel cathode for lithium-ion batteries", *Energy Environ. Sci.*, Vol. 7, issue 4, pp. 1339-1350, April 2014
- Meyers, R.A., (2012), *Encyclopedia of Sustainability Science and Technology*, Springer, New York, USA
- Mo, M., Hui, K.S., Hong, X., Guo, J., Ye, C., Li, A., Hu, N., Huang, Z., Jiang, J., Liang, J., Chen, H., (2014), "Improved cycling and rate performance of Sm-doped  $\text{LiNi}_{0.5}\text{Mn}_{1.5}\text{O}_4$  cathode materials for 5 V lithium ion batteries", *Appl. Surf. Sci.*, Vol. 290, pp. 412-418, January 2014
- Molenda, M., Dziembaj, R., Podstawka, E., Proniewicz, L.M., Piwowarska, Z., (2007), "An attempt to improve electrical conductivity of the pyrolysed carbon- $\text{LiMn}_2\text{O}_{4-y}\text{S}_y$  ( $0 \leq y \leq 0.5$ ) composites", *J. Power Source*, Vol. 174, issue 2, pp. 613-618, December 2007
- Myung, S.-T., and Chung, H.-T., (1999), "Preparation and characterization of  $\text{LiMn}_2\text{O}_4$  powders by emulsion drying method", *J. Power Sources*, Vol. 84, issue 1, pp. 32-38, November 1999
- Oh, S.W., Myung, S.-T., Kang, H.B., Sun, Y.K., (2009), "Effects of Co doping on  $\text{Li}[\text{Ni}_{0.5}\text{Co}_x\text{Mn}_{1.5-x}]\text{O}_4$  spinel materials for 5 V lithium secondary batteries via Co-precipitation", *J. Power Sources*, Vol. 189, pp. 752-756, April 2009

- Ohzuku,T., Ariyoshi,K., Takeda,S., Sakai,Y., (2001), "Synthesis and characterization of 5 V insertion material of  $\text{Li}[\text{Fe}_y\text{Mn}_{2-y}]\text{O}_4$  for lithium-ion batteries", *Electrochim. Acta.*, Vol. 46, issue 15, pp. 2327-2336, April 2001
- Park,S.B., Eom,W.S., Cho,W., Jang,H., (2006), "Electrochemical properties of  $\text{LiNi}_{0.5}\text{Mn}_{1.5}\text{O}_4$  cathode after Cr doping", *J. Power Sources*, Vol. 159, issue 1, pp. 679-684, September 2006
- Peng,Z.-D., Hu,G.-R., Liu,Y.-X., (2005), "The influence on performance and structure of spinel  $\text{LiMn}_2\text{O}_4$  for lithium-ion batteries by doping rare-earth Sm", *J. Cent South Univ Technol.*, Vo., 12, pp. 28-32, October 2005
- Pistoia,G., Antonini,A., Rosati,R., Bellitto,C., (1995), "Effect of Partial  $\text{Ga}^{3+}$  substitution for  $\text{Mn}^{3+}$  in  $\text{LiMn}_2\text{O}_4$  on its behavior as cathode for Li cells", *J. Electroanal. Chem.*, Vol. 410, issue 1, pp. 115-118, Jun 1996
- Prabakaran,S.R.S., Saporil,N.B., Michael,S.S., Massot,M., Julien,C., (1998), "Soft-chemistry synthesis of electrochemically-active spinel  $\text{LiMn}_2\text{O}_4$  for Li-ion batteries", *Solid State Ionics*, Vol. 112, issue 1-2, pp. 25-34, September 1998
- Prabakar,S.J.R., Han,S.C., Singh,S.P., Lee,D.K., Sohn,K.-S., Pyo,M., (2012), "W-doped  $\text{LiW}_x\text{Ni}_{0.5}\text{Mn}_{1.5-x}\text{O}_4$  cathodes for the improvement of high rate performances in Li ion batteries", *J. Power Sources*, Vol. 209, pp. 57-64, July 2012
- Ragupathy,P., Vasana,H.N., Munichandraiah,N., (2010), "Microwave driven hydrothermal synthesis of  $\text{LiMn}_2\text{O}_4$  nanoparticles as cathode material for Li-ion batteries", *Mater. Chem. Phys.*, Vol. 124, issue 1, pp. 870-875, November 2010
- Ram,P., Gören,A., Ferdov,S., Silva,M.M., Choudhary,G., Singhal,R., Costa,C.M., Sharma,R.K., Lanceros-Méndez S., (2017), "Synthesis and improved electrochemical performance of  $\text{LiMn}_{2-x}\text{Gd}_x\text{O}_4$  based cathodes", *Solid State Ionics.*, Vol. 300, pp. 18-25, February 2017
- Ram,P., Gören,A., Ferdov,S., Silva,M.M., Singhal,R., Costa,C.M., Sharma,R.K., Lanceros-Méndez S., (2016), "Improved performance of rare earth doped  $\text{LiMn}_2\text{O}_4$  cathodes for lithium-ion battery applications", *New J. Chem.*, Vol. 40, issue 7, pp. 6244-6252, July 2016
- Ramana,C.V., Massot,M., and Julien,C.M., (2005), "XPS and Raman spectroscopic characterization of  $\text{LiMn}_2\text{O}_4$  spinels", *Surf. Interf. Ana.*, Vol. 37, Issue 4, pp. 412-416, April 2005
- Rdmag, (2014), <https://www.rdmag.com/article/2014/04/trace-degradation-analysis-lithium-ion-battery-components>; 22 April, 2014
- Reddy,T.B., (2010), *Linden's Handbook of Batteries*, 4<sup>th</sup> edition, McGraw-Hill, New Delhi
- Sahan,H., Goktepe,H., Patat,S., (2011), "A novel method to improve the electrochemical performance of  $\text{LiMn}_2\text{O}_4$  cathode active material by  $\text{CaCO}_3$  surface coating", *J. Mater. Sci. Technol.*, Vol. 27, issue 5, pp. 415-420, May 2011
- SC7620, (2011), "Operating manual: SC7620 mini sputter coater" Doc. No. OM-SC7620, issue 5, Quorum technology Ltd.,U.K., May 2011
- Sha,O., Qiao,Z., Wang, S., Tang,Z., Wang,H., Zhang,X., Xu,Q., (2013), "Improvement of cycle stability at elevated temperature and high rate for  $\text{LiNi}_{0.5-x}\text{Cu}_x\text{Mn}_{1.5}\text{O}_4$  cathode material after Cu substitution", *Mater. Res. Bull.*, Vol. 48, issue 4, pp. 1606-1611, April 2013
- Shin,D.W., and Manthiram,A., (2011), "Surface-segregated, high-voltage spinel  $\text{LiMn}_{1.5}\text{Ni}_{0.42}\text{Ga}_{0.08}\text{O}_4$  cathodes with superior high-temperature cyclability for lithium-ion batteries", *Electrochem. Commun.*, Vol. 13, Issue 11, pp. 1213-1216, November 2011
- Singh,G., Panwar,A., Sil,A., Ghosh,S., (2009), "Synthesis and characterization of citric acid assisted Cr doped lithium manganese oxide spinel", *Ceramics - Silikaty*, Vol. 53, issue 4, pp. 260-267, August 2009
- Singhal,R., Das,S.R., Tomar,M.S., Ovideo,O., Nieto,S., Melgarejo,R.E., Katiyar,R.S., (2007), " Synthesis and characterization of Nd doped  $\text{LiMn}_2\text{O}_4$  cathode for Li-ion rechargeable batteries", *J. Power Sources*, Vol. 164, issue 2, pp. 857-861, February 2007
- Song,M.Y., Su,A.D., Gu,K.S., Ho,C.S., (1998), "Influence of the substitution of Fe for Mn on the electrochemical properties of  $\text{LiMn}_2\text{O}_4$ " *Solid State Ionics*, Vol. 111, issues 3-4, pp. 237-242, September 1998
- Subramania,A., Angayarkanni,N., Priya,A.R.S., Gangadharan,R., Vasudevan,T., (2005), " Synthesis and characterization of  $\text{LiMg}_y\text{Mn}_{2-y}\text{O}_4$  cathode materials by modified Pechini process for lithium batteries", *Bull. Mater. Sci.*, Vol. 28., issue 7, pp. 663-667, December 2005
- Sulochana,A., Thirunakaran,R., Sivashanmugam,A., Gopukumar,S., Yamakib,J., (2008), "Sol-Gel synthesis of 5 V  $\text{LiCu}_x\text{Mn}_{2-x}\text{O}_4$  as a cathode material for lithium rechargeable batteries", *J. Electrochem. Soc.*, Vol. 155, issue 3, pp. A206-A210, January 2008

- Sun, Y.-K., Oh, S.W., Yoon, C.S., Bang, H.J., Prakash, J., (2006), "Effect of sulfur and nickel doping on morphology and electrochemical performance of  $\text{LiNi}_{0.5}\text{Mn}_{1.5}\text{O}_{4-x}\text{S}_x$  spinel material in 3-V region", *J. Power Sources*, Vol. 161, issue 1, pp. 19-26, October 2006
- Suryakala, K., Marikkannu, K.R., Kalaignan, G.P., Vasudevan, T., (2008), "Synthesis and electrochemical characterization of  $\text{LiMn}_2\text{O}_4$  and  $\text{LiNd}_{0.3}\text{Mn}_{1.7}\text{O}_4$  as cathode for lithium ion battery", *Int. J. Electrochem. Sci.*, Vol. 3, issue 1, 136-144, February 2008
- Tan, C.L., Zhou, H.J., Li, W.S., Hou, X.H., Lu, D.S., Xu, M.Q., Huang, Q.M., (2008), "Performance improvement of  $\text{LiMn}_2\text{O}_4$  as cathode material for lithium ion battery with bismuth modification", *J. Power Sources*, Vol. 184, issue 2, pp. 408-413, October 2008
- Thirunakaran, R., Kim, K.-T., Kang, Y.-M., Seo, C.-Y., Jai, Y.-L., (2004), "Adipic acid assisted, sol-gel route for synthesis of  $\text{LiCr}_x\text{Mn}_{2-x}\text{O}_4$  cathode material", *J. Power Sources*, Vol. 137, issue 1, pp. 100-104, October 2004
- Thirunakaran, R., Lew, G.H., Yoon, W.-S., (2016), "Sol-Gel synthesis using novel chelating agent and electrochemical characterization of binary doped  $\text{LiMn}_2\text{O}_4$  spinel as cathode material for lithium rechargeable batteries", *World Journal of Nano Science and Engineering*, Vol. 6, pp. 1-19, January 2016.
- Thirunakaran, R., Ravikumar, R., Vanitha, S., Gopukumar, S., Sivashanmugam, A., (2011), "Glutamic acid-assisted sol-gel synthesis of multi-doped spinel lithium manganate as cathode materials for lithium rechargeable batteries", *Electrochimica Acta*, Vol. 58, pp. 348-358, December 2011
- Thirunakaran, R., Sivashanmugam, A., Gopukumar, S., Rajalakshmi, R., (2009), "Cerium and zinc: Dual-doped  $\text{LiMn}_2\text{O}_4$  spinels as cathode material for use in lithium rechargeable batteries", *J. Power Sources*, Vol. 187, issue 2, pp. 565-574, February 2009
- Tian, J.-K., Wan, F.-C., Battaglia, V.S., Zhang, H.-L., (2014), "Synthesis and electrochemical performance of nanosized multiple-doped  $\text{LiMn}_2\text{O}_4$  prepared at low temperature for Li-ion battery", *Int. J. Electrochem. Sci.*, Vol. 9, issue 2, pp. 931-942, February 2014
- Tu, J., Zhao, X.B., Zhuang, D.G., Cao, G.S., Zhu, T.J., Tu, J.P., (2006), "Studies of cyclability of  $\text{LiMn}_2\text{O}_4$  and  $\text{LiLa}_{0.01}\text{Mn}_{1.99}\text{O}_4$  as cathode materials for Li-ion battery", *Physica B: condensed Matter*, Vol. 382, issue 1-2, pp. 129-134, June 2006.
- USGS, (2017), <https://pubs.usgs.gov/fs/2002/fs087-02/>; 15 March 2017
- Wang, G.X., Bradhurst, D.H., Liu, H., Dou, S.X., (1999), "Improvement of electrochemical properties of the spinel  $\text{LiMn}_2\text{O}_4$  using a Cr dopant effect", *Solid State Ionics*, Vol. 120, issue 1-4, pp. 95-101, May 1999
- Wang, H., Tan, A.T., Yang, P., Lai, M.O., Lu, L., (2011), "High-rate performances of the Ru-doped spinel  $\text{LiNi}_{0.5}\text{Mn}_{1.5}\text{O}_4$ : Effects of doping and particle size", *J. Phys. Chem. C*, Vol. 115, issue 13, pp. 6102-6110, March 2011
- Wang, L., Maxisch, T., Ceder, G., (2007), "A first-principles approach to studying the thermal stability of oxide cathode materials", *Chem. Mater.*, Vol. 19, issue 3, pp. 543-552, February 2007
- Wang, Z.-X., Fang, H.-S., Yin, Z.-L., Li, X.-H., Guo, H.-J., Peng, W.-J., (2005), "Synthesis and characterization of high-voltage cathode material  $\text{LiNi}_{0.5}\text{Mn}_{1.5}\text{O}_4$  by one-step solid-state reaction", *J. Central South Univ. Technol.*, vol. 12, Suppl. 1, pp. 54-58, October 2005
- Wen, W., Ju, B., Wang, X., Wu, C., Shu, H., Yang, X., (2014), "Effects of magnesium and fluorine co-doping on the structural and electrochemical performance of the spinel cathode materials", *J. Electrochem. Acta.*, Vol. 147, pp. 271-278, November 2014
- Wu, H.M., Tu, J.P., Yuan, Y.F., Chen, X.T., Cao, G.S., (2006), "One-step synthesis  $\text{LiMn}_2\text{O}_4$  cathode by a hydrothermal method", *J. Power Sources*, Vol. 161, issue 2, pp. 1260-1263, October 2006
- Wu, H.M., Tu, J.P., Chen, X.T., Li, Y., Zhao, X.B., Cao, G.S., (2007), "Effects of Ni-ion doping on electrochemical characteristics of spinel  $\text{LiMn}_2\text{O}_4$  powders prepared by a spray-drying method", *J. Solid State Electrochem.*, Vol. 11, issue 2, pp. 173-176, February 2007
- Wu, P., Zeng, X.L., Zhou, C., Gu, G.F., Tong, D.G., (2013), "Improved electrochemical performance of  $\text{LiNi}_{0.5-x}\text{Rh}_x\text{Mn}_{1.5}\text{O}_4$  cathode materials for 5 V lithium ion batteries via Rh-doping", *Mater. Chem. Phys.*, Vol. 138, issue 2-3, pp. 716-723, March 2013
- Sun, X., Hu, X., Shi, Y., Li, S., Zhou, Y., (2009), "The study of novel multi-doped spinel  $\text{Li}_{1.15}\text{Mn}_{1.96}\text{Co}_{0.03}\text{Gd}_{0.01}\text{O}_{4+\delta}$  as cathode material for Li-ion rechargeable batteries", *Solid State Ionics*, Vol. 180, issues 4-5, pp. 377-380, April 2009
- Sun, Y.-K., Hong, K.-J., Prakash, J., (2003), "The Effect of ZnO Coating on Electrochemical Cycling Behavior of Spinel  $\text{LiMn}_2\text{O}_4$  Cathode Materials at Elevated Temperature", *J. Electrochem. Soc.*, Vol. 150, issue 7, pp. A970-A972, May 2003
- Xie, Y., Yang, R., Yan, L., Qi, L., Dai, K., He, P., (2007), "Synthesis and electrochemical characterization of  $\text{Li}_{1.05}\text{RE}_x\text{Cr}_y\text{Mn}_{2-x-y}\text{O}_4$  spinel as cathode material for rechargeable Li-battery", *J. Power Sources*, Vol. 168, issue 1, pp. 272-277, May 2007

- Xie,Y., Xu,Y., Yan,L., Yang,Z., Yang,R., (2005), "Synthesis and electrochemical properties of Sc-doped  $\text{Li}_{1.05}\text{Sc}_x\text{Mn}_{2-x}\text{O}_4$  spinel as cathodic material for rechargeable Li-battery", *J. Solid State Ionics*, Vol. 176, issue 35-36, pp. 2563-2569, November 2005
- Xu,X.X., Yang,J., Wang,Y.Q., Nuli, Y.N., Wang,J.L., (2007), "LiNi<sub>0.5</sub>Mn<sub>1.5</sub>O<sub>3.975</sub>F<sub>0.05</sub> as novel 5 V cathode material", *J. Power Sources*, Vol. 174, issue 2, pp.1113-1116, December 2007
- Yamada,A., Miura,K., Hinokuma,K., Tanaka,M., (1995), "Synthesis and structural aspects of  $\text{LiMn}_2\text{O}_{4\pm\delta}$  as a cathode for rechargeable lithium batteries", *J. Electrochem. Soc.*, Vol. 142, issue 7, pp. 2149-2156, July 1995
- Yamada,A., and Tanaka,M., (1995), "Jahn-Teller structural phase transition around 280 K in  $\text{LiMn}_2\text{O}_4$ ", *Mat. Res. Bull.*, Vol. 30, issue 6, June 1995
- Yamada,S., Fujiwara,M., Kamada,M., (1995), " Synthesis and properties of  $\text{LiNiO}_2$  as cathode material for secondary batteries", *J. Power Sources*, Vol. 54, issue 2, pp. 209-213, April 1995
- Yang,S.T., Jia,J.H., Ding,L., Zhang,M.C., (2003), "Studies of structure and cyclability of  $\text{LiMn}_2\text{O}_4$  and  $\text{LiNd}_{0.01}\text{Mn}_{1.99}\text{O}_4$  as cathode for Li-ion batteries", *J. Electrochimica Acta.*, Vol 48, issue 5, pp. 569-573, January 2003
- Yang,Z., Jiang,Y., Kim,J.-H., Wu,Y., Li,G.-L., Huang,Y.-H., (2014), "The  $\text{LiZn}_x\text{Ni}_{0.5-x}\text{Mn}_{1.5}\text{O}_4$  spinel with improved high voltage stability for Li-ion batteries", *Electrochimica Acta.* Vol. 117, pp. 76-83, January 2014
- Yi,T.-F., Chen,B., Zhu,Y.R., Li,X.-Y., Zhu,R.-S., (2014), "Enhanced rate performance of molybdenum-doped spinel  $\text{LiNi}_{0.5}\text{Mn}_{1.5}\text{O}_4$  cathode materials for lithium ion battery", *J. Power Sources*, Vol. 247, pp. 778-785, February 2014
- Yi,T.-F., Shu,J., Zhu,Y.-R., Zhu,R.-S., (2009), "Advanced electrochemical performance of  $\text{LiMn}_{1.4}\text{Cr}_{0.2}\text{Ni}_{0.4}\text{O}_4$  as 5 V cathode material by citric-acid-assisted method. *J. Phy. Chem. Solids*, Vol. 70, issue 1, pp. 153-158, January 2009
- Yi,T.-F., Yin,L.-C., Ma,Y.-Q., Shen,H.-Y., Zhu,Y.-R., Zhu,R.-S., (2013), "Lithium-ion insertion kinetics of Nb-doped  $\text{LiMn}_2\text{O}_4$  positive-electrode material", *Ceramics International*, Vol. 39, Issue 4, pp. 4673-4678, May 2013
- Yi,T.-F., Xie,Y., Zhu,Y.-R., Zhu,R.-S., Ye,M.-F., (2012), "High rate micron-sized niobium-doped  $\text{LiNi}_{0.5}\text{Mn}_{1.5}\text{O}_4$  as ultra high power positive-electrode material for lithium-ion batteries", *J. Power Sources*, Vol. 211, issue 1, pp. 59-65, August 2012
- Yoon,C.S., Kim,C.K., Sun,Y.-K., (2002), "Cycling behavior of selenium-doped  $\text{LiMn}_2\text{O}_4$  spinel cathode material at 3 V for lithium secondary batteries", *J. Power Sources*, Vol. 109, issue 1, pp. 234-238, June 2002
- Yoshio,M., Xia,Y., Kumada,N., Ma,S., (2001), "Storage and cycling performance of Cr-modified spinel at elevated temperatures", *J. Power Sources*, Vol. 101, issue 1, pp. 79-85, October 2001
- Yue,H., Huang,X.-K., Lv,D.-P., Yang,Y., (2009), "Hydrothermal synthesis of  $\text{LiMn}_2\text{O}_4/\text{C}$  composite as a cathode for rechargeable lithium-ion battery with excellent rate capability", *Electrochimica Acta*, Vol. 54, issue 23, pp. 5363-5367, September 2009
- Zhang,Y.C., Wang,H., Xu,H.Y., Wang,B., Yan,H., Ahniyaz,A., Yoshimura,M., (2003), "Low-temperature hydrothermal synthesis of spinel-type lithium manganese oxide nanocrystallites", *Solid State Ionics*, Vol. 158, issue 1-2, pp.113-117, February 2003
- Zhao,X., Reddy,M.V., Liu,H., Ramakrishna,S., Rao,G.V.S., and Chowdari,B.V.R., (2012), "Nano  $\text{LiMn}_2\text{O}_4$  with spherical morphology synthesized by a molten salt method as cathodes for lithium ion batteries", *RSC Advances*, Vol. 2, issue 19, pp. 7462-7469, September 2012
- Zheng,C.-H., Liu,X., Wu,Z., Chen,Z.-D., Fang,D.-L., (2013), "Excellent electrochemical performance of porous nanoparticles-constructed granule  $\text{LiMn}_2\text{O}_4$  derived from a highly reactive  $\text{Mn}_3\text{O}_4$ ", *Electrochim. Acta.*, Vol. 111, pp. 192-199, November 2013
- Zhong,G.B., Wang,Y.Y., Zhang,Z.C., Chen,C.H., (2011), "Effects of Al substitution for Ni and Mn on the EC properties of  $\text{LiNi}_{0.5}\text{Mn}_{1.5}\text{O}_4$ ", *Electrochimica Acta*, Vol. 56, Issue 18, pp. 6554-6561, July 2011
- Zhong,G.B., Wang,Y.Y., Zhao,X.J., Wang,Q.S., Yu,Y., Chen,C.H., (2012), "Structural, electrochemical and thermal stability investigations on  $\text{LiNi}_{0.5-x}\text{Al}_{2x}\text{Mn}_{1.5-x}\text{O}_4$  ( $0 \leq 2x \leq 1.0$ ) as 5 V cathode materials", *J. Power Sources*, Vol. 216, pp. 368-375, October 2012
- Zhou,F., Zhao,X., Zheng,H., Zhang,Z., Ji,M.,(2004), "Synthesis and characterization of Sc-doped  $\text{LiSc}_x\text{Mn}_{2-x}\text{O}_4$  spinel cathode material for Li-ion batteries", *Mater. Lett.*, Vol. 58, issue 29, pp. 3720-3724, November 2004
- Zhou,W.J., He,B.L., Li,H.L., (2008), "Synthesis, structure and electrochemistry of Ag-modified  $\text{LiMn}_2\text{O}_4$  cathode materials for lithium-ion batteries", *Mater. Res. Bull.*, Vol. 43, issue 8-9, pp. 2285-2294, August-September 2008