

BIBLIOGRAPHY

Bibliography

1. T. Abe and M. Kaneko, Reduction catalysis by metal complexes confined in polymer matrix, *Prog. Poly. Sci.*, 28, 1441 – 1488, 2003.
2. H. Wendt, M. Gotz, M. Linardi, Tecnologia de celulas a combustivel *Quimica Nova* 23(4), 538-546, 2000.
3. Roman J. Press, K. S. V. Santhanam, Massoud J. Miri, Alla V. Bailey, Gerald A. Takacs, *Introduction to hydrogen Technology*. P-307, John Wiley & Sons, Inc., 2008.
4. W. Kreuter, H. Hofmann, Electrolysis: The important energy transformer in a world of sustainable energy. *Int. J. Hydrogen Energy*, Vol. 23, No. 8, pp. 661-666, 1998
5. D. H. Smith, in “Industrial Electrochemical Process”, A. Kuhn Elsevier, Amsterdam, P-127, 1971.
6. P. M. Spazinate Progress in the electrochemical production of hydrogen, *Quad dell` Ingeg. chim. Ital.*, 11, 155-160, 1975.
7. R. L. LeRoy, Industrial water electrolysis: Present and future, *Int. J. Hydrogen Energy*, 8, 401-417, 1983.
8. H. Wendt, in “Electrochemical Hydrogen Technologies”, Elsevier, Amsterdam, 1990.
9. W. Donitz, E. Erdle, and R. Streicher, in “Electrochemical hydrogen Technologies”, H. Wendt (Ed.), Elsevier, Amsterdam, P. 213, 1990.
10. A. C. C. Tseung and S. Jasem, in “Electrocatalysis of non-Metallic Surface”, N.B.S. Special Publication No. 455, P-281, 1976.
11. D. E. Hall, Alkaline water electrolysis anode materials, *J. Electrochem. Soc.*, 132, 41C-48C, 1985.

12. H. Hofmann, J. Fischer and H. Wendt, Modeling of advanced water electrolysis system, Proc-Electrochem.Soc., 88-18, 261-70, 1988, (Proc. Symp Model Simul Electrolytic Solution Processes, 1987).
13. D. E. Hall, Electrodes for Alkaline water Electrolysis, J. Electrochem. Soc., 128, 741-746, 1981.
14. T. A. Leinderbach, A. M. Greenberg, and V. H. Thomas, in "Modern Chlor Alkali Technology", Coulter M. (Ed) Ellis Horwood Chichester, P-145, 1980.
15. L. L. Chen and A. Lasisa, Study of the kinetics of hydrogen evolution reaction on nickel-zinc alloy electrodes, J. Electrochem. Soc., 138, 3321-3328, 1991.
16. R. N. Singh, J. P. Pandey, K. L. Anitha, Preparation of electrodeposited thin films of nickel-iron alloys on mild steel for alkaline water electrolysis. Part I: studies on oxygen evolution, Int. J. Hydrogen Energy, 18, 467-473, 1993.
17. J. De. Carvalho, G. Tremiliosi-Filho, L. A. Avaca and E.R. Gonzalez, Electrodeposits of iron and nickel-iron for hydrogen evolution in alkaline solutions. Int. J. Hydrogen Energy, 14, 161-165, 1989.
18. Y. Ogata, H. Hori, M. Yasuda and F. Hine, On the cathode behavior and the cell voltage in NaOH solutions under elevated temperatures, J. Electrochem. Soc., 135, 76-83, 1988.
19. D. Hall, Plasma-sprayed nickel cathode coatings for hydrogen evolution in alkaline electrolytes, J. Appl. Electrochem. 14, 107-115, 1984.
20. D. M. Shub, A. N. Chemodanov, V. V. Shalaginov, Electrochemical and corrosion behavior of a film cobalt oxide (Co_3O_4) anode in perchloric acid, Elektrokhimiya, 14, 595-599, 1978.

21. E. R. Kotz and S. V. Stucki: Stabilization of RuO₂ by IrO₂ for anodic oxygen evolution in acid media: *J. Electroanal. Chem.* 228, 407, 1987.
22. E. J. M. D'Sullivan and E. J. Calvo in "Comprehensive chemical kinetics," 27 (Electrode kinetics Reactions) (Ed). R.G. Compton. Elsevier, Amsterdam, p-248 and 294, 1987.
23. R. F. Scarr, The mechanism of oxygen evolution on Ni, Pt and other metals and alloys. *J. Electrochim. Soc.*, 116, 1526 – 1532, 1969.
24. A. Damjanovic JO'M, A. Day, Bockris, Electrode kinetics of oxygen evolution and dissolution on Rh, Ir and Pt-Rh alloy electrodes, *J. Electrochim. Soc.*, 113, 739 – 746, 1966.
25. N. Sato and G. Okamoto, Reaction mechanism of anodic oxygen evolution on Nickel in sulphate solutions, *Electrochim. Acta*, 11, 495-502, 1965.
26. C. Iwakura, K. Hirao, H. Tamura, Preparation of Ruthenium dioxide electrode and their anodic polarization characteristics in acidic solutions, *Electrochim. Acta*, 22, 335-340, 1977.
27. G. Lodi, E. Sivieri, De. Battisti and S. Trasatti, Ruthenium dioxide – based film electrodes, *J. Appli. Electrochem. Acta*, 8, 135-143, 1978.
28. S. Trasatti, Physical electrochemistry of ceramic oxides, *Electrochim. Acta*, 36, 225-241, 1991
29. P. Rasiyah and A. C. C. Tseung, A mechanistic study of oxygen evolution on Li-doped Co₃O₄, *Int. J. Electrochem. Soc.*, 130, 365 – 368, 1983. A mechanistic study of oxygen evolution on NiCo₂O₄, *J. Electrochem. Soc.*, 130, 2384 – 2386, 1983.
30. J. Orehotsky, H. Huang, C. R. Davidson and S. Srinivasan, oxygen evolution on Ni_xFe_{3-x}O₄ electrodes, *J. Electroanal. Chem.*, 95, 233-235, 1979.

31. R. P. Bonchev, J. Zheleva and S. C. Sevov, Morphological and compositional characterization of Copper Cobalt spinel made by mechanochemical reactions, *Chem. Mater.* 2, 93-95, 1990.
32. M. R. Tarasevich, B. N. Efremov in. S. Trasatti, editor, *Electrodes of conductive metallic oxides, part A*, Amsterdam, Elsevier, 1980.
33. L. G. Tejuco, J. L. G. Feirro and J. M. Tascon, in *Advances in catalysis*. Academic Press, New York, 36, 1989.
34. S. Trasatti and G. Lodi, *Electrodes of Conductive metallic oxides, part B*, edited by S. Trasatti, Elsevier Amsterdam, 1981.
35. M. Hamdani, J. F. Koenig and P. Chartier, Films minces de Co_3O_4 et NiCo_2O_4 obtenus par nebulisation reactive (spray) pour Γ , electrocatalysts, II; Etude par voltamperometric cyclique, *J. Appl. Electrochem.*, 18, 568 – 576, 1988.
36. G. Spinolo, S. Ardizzona and S. Trasatti, surface characterization of Co_3O_4 electrodes prepared by the sol-gel method, *J. Electroanal. Chem.*, 423, 49-57, 1997.
37. R. N. Singh, S. K. Tiwari, S. P Singh, A. N Jain and N. K. Singh, Electrocatalytic activity of high specific surface area perovskite type LaNiO_3 via sol-gel route for electrolytic oxygen evolution in alkaline solution, *Int. J. Hydrogen Energy.* 22, 557 – 562, 1997.
38. S. K. Tiwari, J. F. Koenig, G. Poillerat, P. Chartier and R. N. Singh, Electrocatalysis of oxygen evolution / reduction on LaNiO_3 prepared by a novel malic acid aided method, *J. Appl. Electrochem.*, 28, 114-119, 1998.
39. B. M. Reddy and A. Khan, Recent advances on TiO_2 - ZnO_2 mixed oxides as catalysts and catalysts supports, *Catal. Rev.*, 47, 257-296, 2005.

40. M. Hamdani, R. N. Singh, P. Chartier, Co_3O_4 and Co-based spinel oxides bifunctional oxygen electrodes. *Int. J. Electrochem. Sci.* 5, 556-577, 2010.
41. M. E. G. Lyon and M. D. Brandon, The oxygen evolution reaction on passive oxide covered transition metal electrodes in aqueous alkaline solution, Part 1. Nickel, *Int. J. Electrochem. Sci.*, 3, 1386-1424, 2008. The oxygen evolution reaction on passive oxide covered transition metal electrodes in aqueous alkaline solution, part 1, Cobalt, *Int. J. Electrochem. Sci.*, 1424–1462, 2008.
42. A. Kraft, Doped diamond; A compact review on a new, versatile electrode material, *Int. J. Electrochem. Sci.*, 2, 355-385, 2007.
43. M. A. Pena and J. L. G Fierro, Chemical structures and performance of perovskite oxides, *Chem. Rev.*, 101, 1981-2017, 2001.
44. P. F. Carcia, R. D. Shannon, P. E. Bierstedt and R.B. Flippen, Oxygen electrocatalysis on thin-film metallic oxide electrodes with the delafossite structure, *J. Electrochem. Soc.*, 127(9), 1974-1978, 1980.
45. H. S. Horowitz, J. M. Longo and H. H. Horowitz, Oxygen electrocatalysis on some oxide polychlores, *J. Electrochem. Soc.*, 130, 1851-1859, 1983.
46. C. Iwakura, J. E Edamoto and H. Tamura, Effect of electrochemical pretreatment on catalytic activity of Bismuth ruthenate electrodes for OE in alkaline solution, *Bull. Chem. Soc. Jpn.*, 59, 145-148, 1986.
47. S. Trasatti, in “The electrochemistry of novel materials” J. Lipkowskian and P.N. Ross (Ed) VCH Publishers, New York, 1994, 244.
48. D. M. Subb, A. N. Chemodanov and V. V. Shalaginov, Electrochemical and corrosion behavior of a film cobalt oxide

- (Co₃O₄) anode in perchloric acid, *Electrokhimiya*, 114, 595-599, 1978.
49. F. Sevegl, B. Orel, I. G. Svegl and V. Kaucic, Characterization of spinel Co₃O₄ and Li-doped Co₃O₄ thin film electrocatalysts prepared by the sol-gel route, *Electrochem. Acta*, 45, 4359 – 4371, 2000.
50. E. Laouini, M. Hamdani, M. I. S. Pereira, J. Douch, M. H. Mendonca, Y. Berghoute, R. N. Singh, Preparation and electrochemical characterization of spinel type Fe-Co₃O₄ thin film electrodes in alkaline medium, *Int. J. Hydrogen Energy* 33, 4936 – 4944, 2008.
51. I. Nikolov, R. Darkoui, E. Zhecheva, R. Stiyanova, N. Dimitrov, T. J. Vitinov, Electrocatalytic activity of spinel related cobaltites M_xCo_{3-x}O₄ (M = Li, Ni, Cu) in the oxygen evolution reaction, *J. Electroanal. Chem.*, 429, 157–168, 1997.
52. R. Baggio, A. Carugati and S. Trasatti, S. Electrochemical surface properties of cobalt oxide (Co₃O₄) electrodes, *J. Appl. Electrochem.*, 17, 828–840, 1987.
53. S. M. Jasem and A. C. C. Tseung. A potentiostatic pulse study of oxygen evolution on Teflon-bonded nickel-cobalt oxide electrodes, *J. Electrochem. Soc.*, 126, 1353 – 1360, 1979.
54. E. B. Castro, C. A. Gervasi, Electrodeposited Ni-Co oxide electrodes: Characterization and kinetics of the OER, *Int. J. Hydrogen Energy*, 25, 1163-1170, 2000.
55. P. Rasiyah., A. C. C. Tseung and D. B. Hibbert. A mechanistic study of oxygen evolution on NiCo₂O₄, *J. Electrochem. Soc.*, 129, 1724 – 1727, 1982.
56. G. Singh, M. H. Miles and S. Srinivasan in “Electrocatalysis on Non-metallic surface.” Franklin, AD (Ed) (N.B.S. Sepac) Puub. No.

- 455), U.S. Government printing office, Washington DC, p-289 (1976).
57. A. Ait. Aaddi, J. Douch and M. Hamdani, Alkaline oxidation of water on thin films of $\text{Li-Co}_3\text{O}_4$ prepared by thermal decomposition, *J.ChimPhys.* 96, 1198–1211, 1999.
58. E. Rios, J. L. Gautier, G. Poillerat and P. Chartier, Mixed valency spinel oxides of transition metals and electrocatalysis case of the $\text{Mn}_x\text{Co}_{3-x}\text{O}_4$ system, *Electrochem. Acta*, 44, 1491-1498, 1998.
59. A. C. Tavares, M. A. M. Cartaxo, M. I. Das Pereira and F.M. Costa, Electrochemical study of spinel oxide systems with nominal compositions $\text{Ni}_{1-x}\text{Cu}_x\text{Co}_2\text{O}_4$ and $\text{NiCo}_{2-y}\text{Cu}_y\text{O}_4$, *J. solid state Electrochem.*, 5, 57-67, 2001.
60. M. El. Baydi. G. Poillerat, J. L. Gautier, J. L. Respringer, J. F. Koenig and P. Chartier, A sol-gel route for the preparation of Co_3O_4 catalyst for oxygen electrolysis in alkaline medium, *J. Solid state chem.*, 109, 281-288, 1994.
61. M. P. Elizalde, M. Gonjalez, E. Garcia, M. M Davila and G. Poillerat, Characterization of Ni-polyvinylchloride and NiCo_2O_4 / Ni – polyvinylchloride composites as electrodes in alkaline solutions, *J. Electrochem, Soc.*, 144, L263–L266, 1997.
62. I. Nikolov, R. Darkaoui, E. Zhecheva, R. Stoyanova, N. Dimitrov, and T. Vitanov, Electrocatalytic activity of spinel related cobaltities $\text{M}_x\text{Co}_{3-x}\text{O}_4$ (M = Li, Ni, Cu) in the Oxygen evolution reaction, *J. Electranal. chem.*, 429, 157-168, 1997.
63. J. Ponce, J. L. Rehspringer, G. Poillerat and J. L. Gautier Electrochemical study of Nickel–Aluminium–Manganese spinel $\text{Ni}_x\text{Al}_{1-x}\text{Mn}_2\text{O}_4$. Electrocatalytic properties for the oxygen evolution reaction and oxygen reduction reaction in alkaline media, *Electrochem. Acta*, 46, 3373 – 3380,2001.

64. A. C. Tavares, L. Bochatay, M. I. S Da Pereira and FMA Da costa, oxygen evolution on $\text{NiCo}_{2-x}\text{Rh}_x\text{O}_4$ spinel system, *Electrochem. Acta*, 41, 1953 – 1959, 1996.
65. B. Marson, N. Frandete, G. Beaudoin, Physicochemical and electrochemical properties of CuCo_2O_4 electrodes prepared by thermal decomposition for oxygen evolution, *J. Electrochem. Soc.*, 139, 1889 -1896, 1992.
66. M. Musiani, F. Furlanetto and P. Guerriero, Electrochemical deposition and properties of $\text{PbO}_2+\text{Co}_3\text{O}_4$ composites, *J. Electroanal. chem.*, 440, 131-138, 1997.
67. F. Svegl, B. Orel, I. G. Svegl and V. Kaucic, Characterization of spinel Co_3O_4 and Li-doped Co_3O_4 thin film electrocatalysts prepared by the sol-gel route, *Electrochem. Acta*, 45, 4359 – 4371, 2000.
68. J. P. Singh and R. N. Singh, Electrocatalytic properties of spinel-type $\text{M}_x\text{Co}_{3-x}\text{O}_4$ oxides prepared by a new sol-gel route for O_2 evolution in alkaline solutions, *Ind. J. Chem.* 39A, 819–825, 2000.
69. B. Lal, N. K. Singh, S. Samuel and R. N. Singh, Electrocatalytic properties of $\text{Cu}_x\text{Co}_{3-x}\text{O}_4$ ($0 \leq X \leq 1$) obtained by a new precipitation method for oxygen evolution, *J. New Matter. Electrochem. Syst.*, 2, 59-64, 1999.
70. R. N. Singh, J. P. Pandey, N. K. Singh, B. Lal, P. Chartier and J. F. Koenig, sol-gel derived spinel $\text{M}_x\text{Co}_{3-x}\text{O}_4$ ($\text{M}=\text{Ni}, \text{Cu}; 0 \leq X \leq 1$) films and oxygen evolution, *Electrochem. Acta*, 45, 1911 – 1919, 2000.
71. N. K. Singh, J. P. Singh and R. N. Singh, sol-gel derived spinel Co_3O_4 films and oxygen evolution. Part II; Optimization of preparation conditions and influence of the nature of the metal salt precursor, *Int. J. Hydrogen Energy*, 127, 895-903, 2002.

72. R. N. Singh, N. K. Singh and S. P. Singh, Electrocatalytic properties of new active ternary ferrite film anodes for O₂ evolution in alkaline medium, *Electrochim. Acta*, 47, 3873 – 3879, 2002. J.P. Singh, N. K. Singh and R. N. Singh, Electrocatalytic activity of metal substituted Fe₃O₄ obtained at low temperature for O₂ evolution, *Int. J. Hydrogen Energy*, 24, 433-439, 1999.
73. N. K. Singh, S. K. Tiwari, K. L. Anitha and R.N. Singh, Electrocatalytic properties of spinel type Mn_xFe_{3-x}O₄ synthesized below 100 °C for oxygen evolution in KOH solutions, *J. Chem. Soc. Faraday Trans*, 92, 2397-2400, 1996.
74. N. K. Singh and R. N. Singh, Electrocatalytic properties of spinel type Ni_xFe_{3-x}O₄ synthesized at low temperature for oxygen evolution in KOH solution, *Ind. J. Chem.*, 38, 491-495, 1999.
75. R. N. Singh, J. P. Singh, B. Lal, M. J. K. Thomas and S. Bera, New NiFe_{2-x}Cr_xO₄ spinel films for O₂ evolution in alkaline solutions, *Electrochim. Acta*, 51, 5515-5523, 2006.
76. R. N. Singh, J. P. Singh, H. Cong Nguyen and P. Chartier, Effect of partial substitution of Cr on electrocatalytic properties of MnFe₂O₄ towards O₂ evolution in alkaline medium, *Int. J. Hydrogen energy*, 31, 1372-1378, 2006.
77. N. K. Singh, B. Lal and R. N. Singh, Electrocatalytic properties of perovskite type La_{1-x}Sr_xMnO₃ obtained by a novel sol-gel route for O₂ evolution in KOH solutions, *Int. J. hydrogen energy*, 27, 885-893, 2002.
78. Y. Shimizu, H. Matsuda, N. Miura and N. Yamazoe, Bi-functional oxygen electrode using large surface area perovskite type oxide catalyst for rechargeable metal air batteries, *Chem. Lett.*, 21, 1033-1036, 1992.

79. T. Otagawa and J.O'M Bockris, Mechanism of oxygen evolution on perovskites, *J. Phys.Chem.*, 87, 2960-2971, 1983.
80. Y. Matsumoto, J. Kurimoto and E. Sato, Oxygen evolution on Strontium Ferrate (IV) electrode, *J. Electroanal. chem.*, 102, 77-83, 1979.
81. Y. Matsumoto, H. Manable and E. Sato, oxygen evolution on $\text{La}_{1-x}\text{Sr}_x\text{CoO}_3$ electrodes in alkaline solutions, *J. Electrochem. Soc.* 127, 811-814, 1980.
82. T. Otagawa and JO'M Bockris, Lanthanum Nickelate as electrocatalyst: Oxygen evolution, *J. Electrochem. Soc.* 129, 2391-2392, 1982.
83. JO'M Bockris and T. Otagawa, The electrocatalysis of oxygen evolution on perovskites, *J. Electrochem. Soc.*, 131, 290-302, 1984.
84. R. N. Singh, S.K. Tiwari, S. P. Singh, N. K. Singh, G. Poillerat and P. Chartier, Synthesis of (La, Sr) CoO_3 perovskite films via sol-gel route and their physicochemical and electrochemical surface characterization for anode application in alkaline water electrolysis, *J. Chem. Soc. Faraday Trans*, 92, 2593-2598, 1996.
85. S. K. Tiwari, S. P. Singh and R. N Singh, Effects of Ni, Fe, Cu & Cr substitutions for Co in $\text{La}_{0.8}\text{Sr}_{0.2}\text{CoO}_3$ on electrocatalytic properties for oxygen evolution, *J. Electrochem. Soc.*, 143, 1505-1510, 1996.
86. R. N. Singh, J. P. Singh, H. N. Cong, P. Chartier, Effect of partial substitution of Cr on electrocatalytic properties of MnFe_2O_4 towards O_2 evolution in alkaline medium, *Int. J. Hydrogen Energy* 31, 1372-1378, 2006.
87. R. N. Singh, J. P. Singh, B. Lal, A. Singh, Preparation and characterization of $\text{CuFe}_{2-x}\text{Cr}_x\text{O}_4$ ($0 \leq X \leq 1$) nano-spinels for electrocatalysis of oxygen evolution in alkaline solution, *Int. J. Hydrogen Energy*, 32, 11-16, 2007.

88. B. Chi, J. Li, X.Z. Yang, H. Lin, N. Wang, Electrophoretic deposition of ZnCo_2O_4 spinel and its electrocatalytic properties for oxygen evolution reaction, *Electrochim. Acta*, 50, 2059-2064, 2005.
89. M. El. Baydi, G. Poillerat, J. L. Rehspringer, J. F Koenig and P. Chartier, A Sol-gel route for the preparation of Co_3O_4 Catalyst for oxygen electrocatalysis in alkaline medium, *J. Solid state. Chem.*, 109, 281-288, 1994.
90. R. N. Singh and B. Lal, Electrocatalytic characterization of new $\text{La}_{1-x}\text{Sr}_x\text{CoO}_3$ films on Pt for use as oxygen anode in alkaline solutions, *Indian J. Chem.*, 40 A, 1037-1044, 2001.
91. G. I. Zhuravlez, The chemistry and technology of ferrites, *Khimiya*, Leningrad, 1970.
92. Zh. Blyasse, Crystallochemistry of ferrous spinels, *Metallurgiya*, Moscow, 1968.
93. F. S. Romeijn, Physical and crystallographical properties of some spinels, *Philips Res. Rep.*, 8, 304-320, 1953.
94. W. Rudorff and B. Reuter, The structure of the magnesium and zinc-vanadium spinels. Conclusions on the structure of spinels. *Z Anorg. Chem.*, 253, 194-208, 1947.
95. W. L. Roth, Magnetic structure of Co_3O_4 , *J. Phys. Chem. solids*, 25, 1-10, 1964.
96. A. M. Trunov, V. A. Presmov, M. V. Uminshkii, O. F Rakityamaskaya, T. S. Bakutina and A. N Kotseruba, Electroreduction of oxygen on semiconductor catalysts. Physical and electrochemical properties of Complex nickel and Cobalt Oxides, *Electrokhimiya*, 11, 552-559, 1975.
97. E. J. W. Verwey and E. L. Heilmann, Physical properties and cation arrangement of oxides with spinel structures, I. Cation arrangement in Spinets. *J. Chem. Phys.* 15, 174-180, 1947.

98. J. C. B. Nadesan, A. C. C. Tseung, Oxygen evolution on nickel oxide electrodes, *J. Electrochem. Soc.*, 132, 2957-2559, 1985.
99. J. G. D. Haenan, W. Visscher, E. Barendrecht, Oxygen evolution on NiCo_2O_4 electrodes, *J. Appl. Electrochem*, 15, 29-38, 1985.
100. R. Boggio, A. Carugati and S. Trasatti, Electrochemical surface properties of Cobalt Oxide (Co_3O_4) electrodes, *J. Appl. Electrochem*, 17, 828-840, 1987.
101. S. M. Jasem, A. C. C. Tseung, A potentiostatic pulse study of oxygen evolution on teflon-bonded nickel-cobalt oxide electrodes, *J. Electrochem. Soc.*, 126, 1353 – 1360, 1979.
102. P. Resiyah, A. C. C. Tseung and D. B. Hibbert, A mechanistic study of oxygen evolution on NiCo_2O_4 , *J. Electrochem. Soc.*, 129, 1724–1727, 1982.
103. B. N. Efremov and M. R. Tarasevich, Kinetics and mechanism of the electroreduction and liberation of oxygen on Cobalt spinels, *Elektrokhimiya*, 17, 1672-1679, 1981.
104. D. M. Shub, A. N. Chemodanov and V. V. Shalaginov, Electrochemical and corrosion behavior of a film cobalt oxide (Co_3O_4) anode in perchloric acid, *Elektrokhimiya*, 14, 595–599, 1978.
105. A. C. C. Tseung, H. L. Bevan, Preparation and characterization of high surface area semiconducting oxide. *J. Material Science*, 5, 604-610, 1970.
106. M. R. Tarasevich, G. I. Zakharkin, A. M. Khutornoi, F. V. Makardei, V. L. Nikitin, Mechanism of the formation of nickel and cobalt oxides on carbon black, *Zhur, Prikl, Khim (Sankt–Petersburg, Russian Federation)* 49, 953-957, 1976.
107. B. N. Efremov, M. R. Tarasevich, G. I. Zakharkin, F. Z. Sabirov and I. Kropp. A: Formation of complex cobalt and manganese oxides

- of spinel structure on a carbon support, Zhur, Prikl, Khim (Sanskrit Peterburg, Russian Federation), 51, 731-735, 1978.
108. A. C. C. Tseung and S. Jasem, Oxygen evolution on semiconducting oxides, *Electrochem. Acta*, 122, 31-34, 1977.
109. M. R. Tarasevich, B. N. Efremov, in: S. Trasatti, editor, *Electrodes of conductive metallic oxides, Part A: Amsterdam; Elsevier*, 1980.
110. El. Baydi, S. K. Tiwari, R. N. Singh, J. L. Rehspringer, P. Chartier, J. F. Koenig and G. Poillerat, High specific surface area nickel mixed oxide powders LaNiO_3 (perovskite) and NiCo_2O_4 (spinel) via sol-gel type routes for oxygen electrocatalysis in alkaline media, *J. Solid State Chemistry*, 116, 157-169, 1995.
111. R. N. Singh, M. Hamdani, J. F. Koenig, G. Poillerat, J. L. Gautier and P. Chartier, thin films of Co_3O_4 and NiCo_2O_4 obtained by the method of chemical spray pyrolysis for electro-catalysis III. The electrocatalysis of oxygen evolution, *J. Appl. Electrochem.*, 20, 442 – 446, 1990.
112. R. N. Singh, J. F. Koenig, G. Poillerat and P. Chartier, Electrochemical studies on protective thin Co_3O_4 and NiCo_2O_4 films prepared on Titanium by spray pyrolysis for oxygen evolution. *J. Electrochem. Soc.* 137, 1408 – 1413, 1990.
113. S. K. Tiwari, S. Samuel, R. N. Singh, G. Poillerat, J. F. Koenig and P. Chartier. Active thin NiCo_2O_4 film prepared on Nickel by spray pyrolysis for oxygen evolution. *Int. J. Hydrogen Energy*, 20, 9-15, 1995.
114. S. P. Singh, S. Samuel, S. K. Tiwari and R. N. Singh, Preparation of thin Co_3O_4 films on Ni and their electrocatalytic surface properties towards oxygen evolution, *Int. J. Hydrogen Energy*, 21, 171-178, 1996.

115. P. W. T. Lu and S. Srinivasan, Ni based alloys as electrocatalysts for oxygen evolution from alkaline solution, *J. Electrochem. Soc.*, 125, 265-267, 1978; Advances in water electrolysis technology with emphasis on use of the solid polymer electrolyte, *J. Appl. Electrochem.*, 9, 269-283, 1979.
116. V. V. Shalaginov, I. D. Belova, Yu. E. Roginskaya and D. M. Shub, Non stoichiometry, structural defects and electrochemical characteristics of cobalt oxide (Co_3O_4) film electrodes, *Elektrokhimiya*, 14, 1708-1712, 1978.
117. J. Orehotsky, H. Huang. C. R Huang, C. R. Davidson, S. Srinivasan, oxygen evolution on Nickel iron oxide ($\text{Ni}_x\text{Fe}_{3-x}\text{O}_4$) electrodes, *J. Electroanal. Chem. and Interfacial Electrochem.*, 95, 233-234, 1979.
118. C. Iwakura, M. Nishioka, H. Tamura, Relation between oxygen overpotential and magnetic property of spinel type ferrite thin layer electrodes, *Denki Kagaku*, 49, 535-536, 1981.
119. C. Iwakura, M. Nishioka, H. Tamura, oxygen evolution of spinel type ferrite film electrodes, *Nippon Kagaku Kaishi*, 7, 1136-1140, 1982.
120. C. Iwakura, A. Honji and H. Tamura, The anodic evolution of oxygen on tricobalttetraoxide film electrodes in alkaline solutions, *Electrochim. Acta*, 26, 1319-1326, 1981.
121. W. O'Grady, C. Iwakura, J. Huang and E. Yeager, in "Electrocatalysis", Brieter, MW(Ed), The Electrochemical society soft bound proceeding series, Princeton, N.J., p-286, 1974.
122. A. C. C. Tseung, P. Rasiyah, M. C. M. Mann, K. L. K. Yeung, in 'Hydrogen as an Energy vector" commission of European Comm. P-199, 1979.

123. P. Rasiyah, A. C. C. Tseung, The Role of the lower metal oxide/higher metal oxide couple in oxygen evolution reactions, *J. Electrochem. Soc.*, 131, 803-808, 1984.
124. R. Garavaglia, C. M. Mari and S. Trasatti, Physicochemical characterization of Cobalt oxide (Co_3O_4) prepared by thermal decomposition. I: Phase composition and morphology, *Surf. Technol*, 19, 197-215, 1983.
125. S. Trasatti, Electrocatalysis in the anodic evolution of oxygen and chlorine, *Electrochim. Acta*, 29, 1503-1512, 1984.
126. S. Valeri, G. Vattaglin, G. Lodi and S. Trasatti, Effect of calcination temperature on the surface properties of titanium / Ruthenium dioxide supported cobalt oxide (Co_3O_4) layers. A spectroscopic investigation, *colloids and surfaces*, 19, 387-398, 1986.
127. M. Hamdani, J. F. Koenig and P. Chartier, Thin films of Cobalt oxide (Co_3O_4) and cobalt nickel oxide (NiCo_2O_4) obtained by reactive nebulization (spray) for electrocatalysts. I. Preparation and physical analysis, *J. Appl. Electrochem.*, 18, 561-567, 1988.
128. M. Hamdani, J. F. Koenig and P. Chartier, Thin films of cobalt oxide (Co_3O_4) and cobalt nickel oxide (NiCo_2O_4) obtained by reactive nebulization (spray) for electrocatalysts. II. Cyclic voltammetry study, *J. Appl. Electrochem.*, 18, 568-576, 1988.
129. S. Trasatti, Physical Electrochemistry of Ceramic Oxides, *Electrochim. Acta*, 26, 225-241, 1991.
130. E. Rios, P. Chartier and J. L. Gautier, Oxygen evolution electrocatalysis in alkaline medium at thin $\text{Mn}_x\text{Co}_{3-x}\text{O}_4$ ($0 \leq X \leq 1$) spinel films on glass / SnO_2 ; prepared by spray pyrolysis, *solid state science*, 1, 267-277, 1999.

131. M. R. Gennero de Chialvo and A. C. Chialvo, oxygen evolution reaction on Nickel Cobalt oxide ($\text{Ni}_x\text{Co}_{3-x}\text{O}_4$) electrodes with spinel structure, *Electrochim. Acta*, 38, 2247-2252, 1993.
132. G. Spinolo, S. Ardizzone and S. Trasatti, surface characterization of Co_3O_4 electrodes prepared by the sol-gel method, *J. Electroanal. Chem.*, 423, 49-57, 1997.
133. D. Baronetto, I. M Kodintsev and S. Trasatti, Origin of ohmic losses at Co_3O_4 / Ti electrodes, *J. Appl. Electrochem.*, 24, 189-194, 1994.
134. B. Marsan, N. Frandete, G. Beaudoin, Physicochemical and electrochemical properties of CuCo_2O_4 electrodes prepared by thermal decomposition for oxygen evolution, *J. Electrochem. Soc.*, 139, 1889-1896, (1992).
135. K. Fatih, and B. Marsan, $\text{Cu}_x\text{Co}_{3-x}\text{O}_4$ / LaPO_4 - bonded Ni-electrode for O_2 evolution in alkaline solution: Preparation, physicochemical properties and electrochemical behavior, *Can. J. Chem.*, 75, 1597-1607, 1997.
136. C. Bocca, G. Cerisola, E. Magnone and Burbucci, Oxygen evolution on Co_3O_4 and Li-doped Co_3O_4 electrode in alkaline solution, *Int. J. Hydrogen energy*, 24, 699-707, 1999.
137. C. Bocca, A. Barbucci, M. Delucchi and G. Cerisola, Ni-Co oxide coated electrodes: Influence of the preparation technique on OER in an alkaline solution, *Int. J. Hydrogen energy*, 24, 21-26, 1999.
138. M. Hamdani, M. I. S. Pereira, J. Douch, A. Ait. Addi, Y. B. Arghoute and M.H. Mendonca, Physicochemical and electrochemical properties of $\text{Li-Co}_3\text{O}_4$ anodes prepared by chemical spray pyrolysis for application in alkaline water electrolysis, *Electrochim. Acta*, 49, 1555-1563, 2004.

139. J. P. Singh and R. N. Singh, new active spinel-type $M_xCo_{3-x}O_4$ films for electrocatalysis of oxygen evolution, *J. New Mater. Electrochem. Systems*, 3, 137-145, 2000.
140. A. C. Tavares, L. Bochaty, M. I. Da Silva Pereira, FMA Da Costa, Oxygen evolution on $NiCo_{2-x}Rh_xO_4$ spinel system, *Electrochim. Acta*, 41, 1953-1959, 1996.
141. A. C. Tavares M. A. M Cortaxo, M. I. Da Silva Pereira, FMA Da Costa, Effect of the partial replacement of Ni or Co by Cu on the electrocatalytic activity of the $NiCo_2O_4$ spinel oxide, *Electroanal. Chem.*, 464, 187-197, 1999.
142. A. C. Tavares, M. I. Da Silva Pereira, M. H. Mendonca, M.R. Nunes, FMA da Costa and C.M. Sa, XPS and voltammetric studies on $Ni_{1-x}Cu_xCo_2O_4$ spinel oxide electrodes, *J. Electroanal. chem.*, 449, 91-100, 1998.
143. M. I. Pereira, F. Nunes, M. H. Mendonca, F. Costa, C. Cominellis, M. Doyle, and J. Winnic (Eds), Energy and electrochemical processes for a cleaner environment, *Proc. vol. 2001-23*, The Electrochemical Society, New York, p-414, 2001.
144. F. Nunes, M. H. Mendonca, M. I. Da silva Pereira and F. M. Costa, Preparation and characterization of spinel type cobalt and Rhodium oxide coatings on Titanium. *Mat. Chem. Phys.*, 92, 526-533, 2005.
145. C. Cannas, A. Musinu, D. Reddis, G. Piccaluga, New synthesis of ferrite silica nanocomposites by a sol-gel auto combustion, *J. Nanoparticle, Res.*, 6, 223-232, 2004.
146. Bo. Chi, J Li, Y Han and Y. Chen, Effect of temperature on the preparation and electrocatalytic properties of a spinel $NiCo_2O_4$ / Ni electrode, *Int. J. Hydrogen energy*, 29, 605-610, 2004.

147. Bo. Chi, J. Li, Y Yang, H. Lin and N. Wang, Electrophoretic deposition of ZnCo_2O_4 spinel and its electrocatalytic properties for oxygen evolution, *Electrochim. Acta*, 50, 2059-2064, 2005.
148. Bo. Chi, H. Lin and J. Li, Cations distribution of $\text{Cu}_x\text{Co}_{3-x}\text{O}_4$ and its electrocatalytic activities for oxygen evolution reaction. *Int. J. Hydrogen energy*, 33, 4763-4768, 2008.
149. M. H. Mendonca, M. I Godinho, M. A. Catarino, M. I. da Silva Pereira and FM Costa, Preparation and Characterization of spinel oxide, ferrites suitable for oxygen evolution anodes solid state science, 4,175-182, 2002.
150. M. I. Godinho, M. A. Catarino, M. I. da Silva Pereira, I. H. Mendonca and F. M Costa, Effect of the partial replacement of Fe by Ni and/or Mn on the electrocatalytic activity for oxygen evolution of the CoFe_2O_4 spinel oxide electrode, *Electrochim. Acta*, 47, 4307-4314, 2002.
151. S. Palmas, F. Ferrara, A. Vacca, M. Mascia and A. M Polcaro, Behavior of cobalt oxide electrodes during oxidative processes in alkaline medium, *Electrochim. Acta*, 53, 400-406, 2007.
152. S. Palmas, F. Ferrara, A. Pisu and C. Cannas, Oxygen evolution of $\text{Ti/Co}_3\text{O}_4$ Coated electrodes in alkaline solution, *Chem. Pap.*, 61, 77-82, 2007.
153. S. Palmas, F. Ferrara, M. Mascia, A. M. Polcaro, J. Rodriguez Ruiz, A. Vacca and Piccalnga, Modeling of oxygen evolution at teflon-bonded $\text{Ti/Co}_3\text{O}_4$ electrodes, *Int. J. Hydrogen Energy*, 34,1647-1654,2009.
154. R. N .Singh, J. P. Singh, B. Lal, A. Singh, Preparation and characterization of $\text{CuFe}_{2-x}\text{Cr}_x\text{O}_4$ ($0 \leq X \leq 1$) nanospinels for electro catalysis of oxygen evolution in alkaline solution, *Int. J. Hydrogen energy*, 32, 11-16, 2007.

155. R. N. Singh, A. Mishra, Anindita, A. S. K. Sinha, A. Singh, Novel electrocatalyst for generating oxygen from alkaline water electrolysis. *Electro. Commun.*, 9, 1369-1373, 2007.
156. R. N. Singh, Madhu, R. Awasthi, S. K. Tiwari, Iron molybdates as electrocatalysts for O₂ evolution reaction in alkaline solution, *Int. J. Hydrogen Energy*, 34, 4693-4700, 2009.
157. R. N. Singh, Madhu. R. Awasthi and A. S. K. Sinha, Preparation and electrochemical characterization of a new NiMoO₄ catalyst for electrochemical O₂ evolution, *J. Solid State Electrochem.*, 13(10), 1613-1619, 2009.
158. R. N. Singh, Madhu, R. Awasthi and A. S. K. Sinha, Electrochemical characterization of a new binary oxide of Mo with Co for O₂ evolution in alkaline solution, *Electrochim. Acta*, 54, 3020-3025, 2009.
159. E. Laouini, M. Hamdani, M. I. S Pereira, J. Douch, M. H Mendonca, Y. Berghoute, R. N. Singh, Preparation and electrochemical characterization of spinel type Fe-Co₃O₄ thin film electrodes in alkaline medium, *Int. J. Hydrogen Energy*, 33, 4936-4944, 2008.
160. E. Laouini, M. Hamdani, M. I. S. Pereira, Y. Barghoute, J. Douch, M. H. Mendonca, Electrochemical impedance study of spinel type Fe-Co₃O₄ oxide thin film electrode in alkaline medium, *Int. J. Electrochim. Sci.*, 4, 1074-1084, 2009.
161. Anindita, A. Singh and R. N. Singh, Effect of V-substitution at B-site on the physicochemical and electrocatalytic properties of spinel type NiFe₂O₄ towards oxygen evolution in alkaline solution. *Int. J. Hydrogen Energy*, 35, 3243-3248, 2010.
162. J. Jingshu, L. Xingyong, C. Guohua, Stable spinel type Co and Cu oxide electrodes for O₂ and H₂ evolutions in alkaline solution, *Electrochim. Acta*, 55, 8197-8206, 2010.

163. L. Bagan, C. Dianxue, W. Pan, W. Guiling and G. Yinyi, OER on Ni-substituted Co_3O_4 nanowires array electrodes, *Int. J. Hydrogen Energy*, 36, 72-78, 2011.
164. W. Hongjun, R. Qin, LiLi and W. Baohui, Characterization and electrocatalytic properties of Ti-based $\text{Ru}_{0.3}\text{Co}_{0.7-x}\text{Ce}_x$ mixed oxide electrodes for oxygen evolution in alkaline solution, *J. Nanomater.*, 1-7, 2011 (doi = 10.1155 / 2011 / 624067).
165. Q. Zhang, Z. Dwei, C. Liu, X.Lui, Y. Q. Qi, S. G. Chen, W. Ding, Y. Ma, F Shi and Y M Zhou; Cu doped Co oxide electrodes for OER prepared by magnetron sputtering, *Int. J. Hydrogen Energy*, 37, 822-830, 2012.
166. M. S. Al-Hoshan, J. P. Singh, A. M. Al-Mayouf, A. A. Al-Suhybani and M. N. Shaddad, Synthesis, Physicochemical and electrochemical properties of nickel ferrite spinels obtained by hydrothermal method for the OER, *Int. J. Electrochem. Sci.*, 7, 4959-4973, 2012.
167. H. D. Megaw, Crystal structure of double oxides of the perovskite type, *Proc Phys Soc*, 58, 133-152, 1946.
168. V. M. Goldschmidt, Laws of crystal chemistry, *Naturwissenschaften*, 14, 477-485, 1926.
169. P. Courty, C. Marcilly, in "Preparation of Catalysts, I", Delmon, B, Jacobs, PA and Poncelet (Eds.), Elsevier, Amesterdam, p. 119 (1976).
170. R. J. H. Voorhoeve, J. P. Remeika and L. E. Trimble, Defect chemistry and catalysis in oxidation and reduction over perovskite-type oxides, *Ann NY Acad Sci*, 272, 3-21, 1976.
171. D. B. Hibbert, A. C. C. Tseung, A critical examination of a cryochemical method for the preparation of high surface area semiconducting powders. Part 2. Non aqueous solvents. The

- behavior of solid solutions in freeze drying, *J Mater Sci*, 14, 2665-2671, 1979.
172. J. Kirchnerova, D. Klvana, Preparation and characterization of high surface perovskite electrocatalysts, *Int J Hydrogen Energy*, 19, 501-506, 1994.
173. G. Karlsson, Reduction of oxygen on lanthanum nickel oxide (LaNiO_3) in alkaline solution, *J Power Sources*, 10, 319-331, 1983.
174. Y. Matsumoto, E. Sato, Oxygen evolution reaction on perovskite type oxide prepared by plasma jet spraying, *Denki Kagaku*, 51, 783-785, 1983.
175. T. Sasaki, Y. Matsumoto, J. Hombo, A new preparation method of lanthanum manganese oxide (LaMnO_3) perovskite using electrochemical oxidation, *J Solid state Chem*, 91, 61-70, 1991.
176. Y. Matsumoto, T. Sasaki, J. Hombo, A new preparation method of lanthanum manganese oxide (LaMnO_3) perovskite film on strontium titanate (SrTiO_3) electrode, *J Electrochem Soc*, 130, 1259-1263, 1991.
177. Y. Matsumoto, T. Sasaki and J. Hombo, A new preparation method of lanthanum cobalt oxide, LaCoO_3 , perovskite using electrochemical oxidation, *Inorg Chem* 31, 738-741, 1992.
178. H. Konno, M. Tokita and R. Furuichi, formation of perovskite structure lanthanum calcium chromium oxide ($\text{La}_{1-x}\text{Ca}_x\text{CrO}_3$) films with electrodeposition, *J Electrochem Soc*, 137, 361-362, 1990.
179. K. Vidyasagar, J. Gopalakrishnan and C. N. R. Rao, Synthesis of complex metal oxides using hydroxide, cyanide and nitrate solid solution precursors, *J Solid State Chem*, 58, 29-37, 1985.
180. J. K. Vassiliou, M. Hornbostel, R. Ziebarth and F. J. Disalvo, Synthesis and properties of neodymium (NdNiO_3) prepared by low-temperature methods, *J solid State Chem.*, 81, 208-216, 1989.

181. Y. Teraoka, H. Kakebayarhi, I. Moriguchi and S. Kagawa, Hydroxy acid-aided synthesis of perovskite-type oxides of cobalt and manganese, *Chem Lett*, 673-676, 1991.
182. H. Taguchi, H. Yoshioka, D. Matsuda and M. Nagao, Crystal structure of lanthanum manganese oxide ($\text{LaMnO}_{3+\delta}$) synthesized using poly (acrylic acid), *J Solid State Chem*, 104, 460-463, 1993.
183. D. B. Meadowcroft, Low-cost oxygen electrode material, *Nature*, 226, 847-848, 1970.
184. G. Fiori, C. Mandelli, C. M. Mari, P. V. Scolari, in T. N. Veziroglu and W. Scifritz, (Eds.) "hydrogen Energy Systems" Vol. 1, Pergamon press, Oxford, p. 193 (1978).
185. G. Fiori, C. M. Mari, T. N. Veziroglu, K. Fueki and T. Ohta, (Eds.), "Hydrogen Energy Process", Vol. 1, Pergamon press, Oxford, p. 165 (1981).
186. G. Fiori, C. M. Mari, The use of superficial techniques of analysis in the evaluation of electrocatalytic materials in the anodic evolution of oxygen, *Adv Hydrogen Energy*, 3, 291-297, 1982.
187. G. Fiori, C. M. Mari, B. Perra, L. Vago and P. Vitali, EC Report EUR, 6783, Hydrogen Energy Vector, p. 223, (1980) and references therein.
188. G. Fiori, C. M. Mari, electrocatalysis of oxygen evolution, *Int J Hydrogen Energy*, 7, 489-493, 1982.
189. G. Fiori, C. M. Mari, F. Pietrobani and G. Terzaghi, (CEC, Luxemburg. Report 1983, EUR-8365-IT, Order No. PB84-211895, 36 pp (Ital.) Avail NTIS. From Govt. Rep. Announce, Index (US), 84, 72, 1984.
190. Y. Matsumoto, E. Sato, Oxygen evolution on Lanthanum strontium manganese oxide electrodes in alkaline solutions, *Electrochem Acta*, 24, 421-423, 1979.

191. Y. Matsumoto, S. Yamada, T. Nishida and E. Sato, Oxygen evolution on lanthanum strontium iron cobalt oxide ($\text{La}_{1-x}\text{Sr}_x\text{Fe}_{1-y}\text{Co}_y\text{O}_3$) series oxides, *J Electrochemical Soc*, 127, 2360-2364, 1980.
192. S. Yamada, Y. Matsumoto and E. Sato, Oxygen evolution on $\text{La}_{1-x}\text{Sr}_x\text{Fe}_{1-y}\text{Ni}_y\text{O}_3$ series oxides, *Denki Kagaku Butsuri Kagak*, 49, 269-273, 1981.
193. A. I. Krasil'shchikov, Intermediate stages in the anodic evolution of oxygen. *Zh Fiz Khim*, 37, 531-537, 1963.
194. Y. Matsumoto, Y. Yashuhide and E. Sato, Multiple cation substitution and discussion of cationic valence in the perovskite oxide, *Yogyo Kyokaishi*, 93, 743-749, 1985.
195. A. G. C. Kobussen, G. H. J. Broers, The oxygen evolution on lanthanum barium cobalt oxide ($\text{La}_{0.5}\text{Ba}_{0.5}\text{CoO}_3$). Theoretical impedance behavior for a multistep mechanism involving two adsorbates, *J Electroanal Chem*, 126, 221-240, 1981.
196. A. G. C. Kobussen, C. M. A. M. Mesters, Oxygen evolution on lanthanum barium cobaltate ($\text{La}_{0.5}\text{Ba}_{0.5}\text{CoO}_3$) in alkaline solutions. Steady-state and reaction order experiments, *J Electroanal Chem*, 115, 131-136, 1980.
197. A. G. C. Kobussen, H. Willems and G. H. J. Broers, The oxygen evolution on lanthanum barium cobaltate ($\text{La}_{0.5}\text{Ba}_{0.5}\text{CoO}_3$). Overpotential decay behavior: theory and experimental results, *J Electroanal Chem*, 142, 67-84, 1982.
198. JO'M. Bockries, T. Otagawa and V. Young, Solid state surface studies of the electrocatalysis of oxygen evolution on perovskite, *J Electroanal Chem*, 150, 633-643, 1983.

199. H. Wendt, V. Plzak, Electrocatalytic and thermal activation of anodic oxygen and cathodic hydrogen evolution in alkaline water electrolysis, *Electrochim Acta*, 28, 27-34, 1983.
200. T. Schmidt H. Wendt, Electrocatalysis of cathodic hydrogen and anodic oxygen evolution in alkaline water electrolysis by in situ activation procedures, *Electchim Acta*, 39, 1763-1767, 1994.
201. H. Wendt, Preparation morphology and effective and effective electrocatalytic activity of gas evolving and gas consuming electrodes, *Electrochim Acta*, 39, 1749-1756, 1994.
202. J. Balej, electrocatalyst for oxygen evolution in advanced water electrolysis, *Int J Hydrogen Energy*, 10, 89-99, 1985.
203. P. Rasiyah A. C. C. Tseung, in A. S, strub and G. Imarisio (Eds.), "Oxygen evolution on Cobalt and Nickel Oxide at Elevated Temperature in Hydrogen as an energy carrier", Reidal Dornrecht, p. 110 D (1983).
204. J. G. D. Haenan W. Visscher, Varendrecht, "Oxygen evolution on NiCo₂O₄ electrodes", Ext. abstracts, 34th Meeting ISE Abstr. No. 0303 Erlangen, 1983.
205. H. Vandenborre, R. Leysen and P. H. Vermeiren, "Spinel Oxides as anode materials in advanced alkaline water electrolysis", Ext. Abstracts, 34th Meeting ISE Abstr. No. 0321 Erlangen, 1983.
206. P. H. Vermeiren, R. Leysen, H. W. king, G. J. Murphy and H. Vanden Borre, Oxygen evolution on cobalt lanthanum nickel strontium oxide (La_{0.8}Sr_{0.2}Ni_{0.2}Co_{0.8}O₃) electrocatalysts in alkaline medium, *Int J Hydrogen energy*, 12, 469-472, 1987.
207. J. C. Grenier, M. Pouchard and P. Hagenmuller, Vacancy ordering in oxygen deficient perovskite-related ferrites, *Struct Bonding* (Berlin), 47, 1-25, 1981.

208. M. A. Alario-Franco, M. J. R. Henche, M. Vallet, J. M. G. Calbet, J. C. Grenier, a. wattiaux and P. Hagenmuller, Microdomain texture and oxygen excess in the calcium-lanthanum ferrite: $\text{Ca}_2\text{LaFe}_3\text{O}_8$, *J solid State Chem*, 46, 23-40, 1983.
209. M. A. Alario-Franco, J. M. G. Calbet, M. Vallet and J. C. Grenier, Brownmillerite-type microdomains in the calcium lanthanum ferrite: $\text{Ca}_x\text{La}_{1-x}\text{FeO}_{3-y}$. I. $2/3 < x < 1$, *J Electrochem Soc*, 49, 219-231, 1983.
210. J. C. Grenier, N. Ea, M. Pouchard and M. Abbou-sekkina, Electrical and magnetic properties of oxidized ferrites lanthanum strontium ferrite ($\text{La}_{1-x}\text{Sr}_x\text{FeO}_{3-y}$), *Mater res Bull*, 19, 1301-1309, 1984.
211. Y. Matsumoto, J. Kurimoto and E. Sato, Anodic characteristics of substituted strontium iron oxide ($\text{SrFe}_{0.9}\text{M}_{0.1}\text{O}_3$) (M = nickel, cobalt, titanium, manganese) electrodes, *Electrochim Acta*, 25, 539-543, 1980.
212. G. Bronoel, J. C. Grenier and J. Reby, Comperative behavior of various oxides in the electrochemical reduction of oxygen evolution and reduction in alkaline medium, *Electrochim Acta*, 25, 1015-1018, 1980.
213. Y. Takada, R. Kanno, T. Kondo, T. Yamoto, M. Taguchi, M. Shimada and M. Koizumi, Properties of $\text{SrMO}_{3-\delta}$ (M = Fe, Co) as oxygen electrodes in alkaline solution, *J Appl Electrochem*, 12, 275-280, 1982.
214. F. R. Van Buren, G. H. J. Broers, A. J. Bauman and C. Boesveld, The electrochemical determination of oxygen ion diffusion coefficients in lanthanum strontium cobalt oxide ($\text{La}_{0.5}\text{Sr}_{0.5}\text{CoO}_{3-y}$). Experimental results and related properties, *J Electroanal Chem*, 88, 353-361, 1978.

215. J. C. Grenier, N. Ea and M. Pouchard, Relations between physical properties and electrocatalytic properties of ferrites ($\text{La}_{1-x}\text{Sr}_x\text{FeO}_{3-y}$), *Rev Chem Mine*, 21, 692-700, 1984.
216. H. Tamura, Y. Yoneyama and Y. Marsumoto, in “Electrodes of Conductive Metallic Oxides”, Part A, Trasatti, S (Ed.), Elsevier, New York, p. 261 (1980).
217. A. Wattiaux, J. C. Grenier, M. Pouxhard and P. Hagemmuller, Electrolytic oxygen evolution in alkaline medium on lanthanum strontium ferrate ($\text{La}_{1-x}\text{Sr}_x\text{FeO}_{3-y}$) perovskite-related ferrites. I. Electrochemical study, *J Electrochem Soc*, 134, 1714, 1987.
218. A. Wattiaux, J. C. Grenier, M. Pouxhard and P. Hagemmuller, Electrolytic oxygen evolution in alkaline medium on lanthanum strontium ferrate ($\text{La}_{1-x}\text{Sr}_x\text{FeO}_{3-y}$) perovskite-related ferrites. II, Influence of bulk properties, *J Electrochem Soc*, 134, 1718-1724, 1987.
219. R. E. Carbonio, C. Fierro, D. Tryk, D. Scherson and E. Yeager, Perovskite-type oxides: oxygen electrocatalysis and bulk structure, *J Power Sources*, 22, 387-398, 1988.
220. S. P. Mehandru, A. B. Anderson, Oxygen evolution on a strontium ion oxide (SrFeO_3) anode. Mechanistic Consideration from molecular orbital theory, *J Electrochem Soc*, 136, 158-166, 1989.
221. L. G. Tejuca, J. L. F. Fierro and J. M. Tascon, in “Advances in Catalysis”, Academic press, New York, p. 36 (1989).
222. Y. Shimizu, K. Uemura, H. matsuda, N. Miura and N. Yamazoe, Bi-functional oxygen electrode using large surface area lanthanum calcium cobalt oxide ($\text{La}_{1-x}\text{Ca}_x\text{CoO}_3$) for rechargeable metal-air battery, *J electrochem Soc*, 137, 3430-3433, 1990.
223. Y. Shimizu, H. Matsuda, N. Miura and N. Yamazoe, Bi-functional oxygen electrode using large surface area perovskite-type oxide

- catalyst for rechargeable metal-air batteries, *Chem Lett*, 1033-1036, 1992.
224. S. Mueller, K. Striebel and O. Hass, $\text{La}_{0.6}\text{Ca}_{0.4}\text{CoO}_3$: A stable and powerful catalyst for bi-functional air electrodes, *Electrochim Acta*, 39, 1661-1668, 1994.
225. T. Lippert, M. J. Motenegro, M. Dobeli, A. Weidenkaff, S. Muller, P. R. Willmott and A. Wokaun, Perovskite thin films deposited by pulsed laser ablation as model systems for electrochemical applications, *Prog Solid State Chem*, 35, 221-231, 2007.
226. M. Bursell, M. Pirjamali and Y. Kiros, $\text{La}_{0.6}\text{Ca}_{0.4}\text{CoO}_3$, $\text{La}_{0.1}\text{Ca}_{0.9}\text{CoO}_3$ and LaNiO_3 as bifunctional oxygen electrodes, *Electrochim Acta*, 47, 1651-1660, 2002.
227. A. Kahoul, A. Hammouche, G. Poillerat and R. W. de Doncker, Electrocatalytic activity and stability of $\text{La}_{1-x}\text{Ca}_x\text{CoO}_3$ perovskite-type oxides in alkaline medium, *Catal today*, 89, 287-291, 2004.
228. N-L. Wu, W-R. Liu and S-J. Su, Effect of oxygenation on electrocatalysis of $\text{La}_{0.6}\text{Ca}_{0.4}\text{CoO}_3$ in bifunctional air electrode, *Electrochim Acta*, 48, 1567-1571, 2003.
229. S. K. Tiwari, P. Chartier and R. N. Singh, Preparation of perovskite-type oxides of cobalt by the malic acid aided process and their electrocatalytic surface properties in relation to oxygen evolution, *J. Electrochem Soc*, 142, 148-153, 1995.
230. A. N. Jain, S. K. Tiwari, R. N. Singh and P. Chartier, Low temperature synthesis of perovskite-type oxides of lanthanum and cobalt and their electrocatalytic properties for oxygen evolution in alkaline solutions, *J Chem Soc Faraday Trans*, 91, 1871-1875, 1995.
231. R. N. Singh, L. Bahadur, J. P. Pandey, S. P. Singh, P. Chartier and G. Poillerat, Preparation and characterization of thin films of

- LaNiO₃ for anode application in alkaline water electrolysis, *J Appl Electrochem*, 24, 149-156, 1994.
232. S. P. Singh, R. N. Singh, G. Poillerat and P. Chartier, Physicochemical and electrochemical characterization of active films of LaNiO₃ for the use as anode in alkaline water electrolysis, *Int J Hydrogen Energy*, 20, 203-210, 1995.
233. R. N. Singh, A. N. Jain, S. K. Tiwari, G. Poillerat and P. Chartier, Physicochemical and electrochemical properties of LaNiO₃ prepared by a low temperature route for anode application in alkaline water electrolysis, *J Appl Electrochem*, 25, 1133-1138, 1995.
234. R. N. Singh, S. K. Tiwari, S. P. Singh, A. N. Jain and N. K. Singh, Electrocatalytic activity of high specific surface area perovskite-type LaNiO₃ via sol gel route for electrolytic oxygen evolution in alkaline solution, *Int J Hydrogen Energy*, 22, 557-562, 1997.
235. A. N. Jain, S. K. Tiwari and R. N. Singh, Electrocatalytic properties of lanthanum manganite-based oxides obtained by low temperature method, *Ind J Chem*, 37A, 125-129, 1998.
236. N. K. Singh, S. K. Tiwari and R. N. Singh, Electrocatalytic properties of lanthanum manganites obtained by a novel malic acid-aided route, *Int J Hydrogen Energy*, 23, 775-780, 1998.
237. T. Sharma, N. K. Singh, S. K. Tiwari and R. N. Singh, Electrocatalytic properties of La-manganites prepared by low temperature synthesis, *Ind J Engg mat Sci*, 5, 38-42, 1998.
238. N. K. Singh, B. Lal, and R. N. Singh, Electrocatalytic properties of perovskite type La_{1-x}Sr_xMnO₃ obtained by novel sol-gel route for O₂ evolution in 1 M KOH solutions, *Int. J Hydrogen Energy*, 27, 885-893, 2002.

239. R. N. Singh, S. K. Tiwari, T. Sharma, P. Chartier and J. F. Koenig, Investigation of oxygen evolution on $\text{LaNi}_{1-x}\text{M}_x\text{O}_3$ ($\text{M} = \text{Fe}, \text{Co}, \text{Cu}; 0 \leq x \leq 0.5$) films of controlled roughness, *J New Mater Electrochem Syst*, 2, 65-69, 1999.
240. B. Lal, M. K. Raghunanda, M. Gupta and R. N. Singh, Electrocatalytic properties of perovskite-type $\text{La}_{1-x}\text{Sr}_x\text{CoO}_3$ ($0 \leq x \leq 0.4$) obtained by novel stearic acid sol-gel method for electrocatalysis of O_2 evolution in KOH solutions, *Int J Hydrogen energy*, 30, 723-729, 2005.
241. N. Krstajic, S. Trasatti, Surface and electrocatalytic properties of $\text{NiO}_x + \text{FeO}_x$ mixed oxide electrodes for O_2 evolution, *Proceedings-Electrochemical Society*, 95-26, 155-165, 1996.
242. Y. Matsumoto, E. Sato, Electrochemical properties of the single crystal lanthanum lead manganate ($\text{La}_{0.7}\text{Pb}_{0.3}\text{MnO}_3$) electrode, *Electrochim. Acta*, 25, 585-589, 1980.
243. E. J. M. O`Sullivan and E. J. Calvo, *Comprehensive chemical kinetics*, 27, (Electrode Kinetic Reactions) (Ed.) R. G. Compton, Elsevier, Amsterdam, 248-294, 1987.
244. Shanwen Tao, Feng Gao, Xingqin Liu and Ole Toft Sørensen, Preparation and gas-sensing properties of CuFe_2O_4 at reduced temperature, *Materials Science and Engineering B77* (2000) 172–176
245. Maensiri, C Masingboon, B Boonchom, S Seraphin, A simple route to synthesize nickel ferrite (NiFe_2O_4) nanoparticles using egg white, *Scripta Materialia*, 56, 797-800, 2007.
246. Y. Teraoka, H. Kakebayashi, I. Moriguchi, and S. Kagawa, *Chemistry Letters* (1991) 673-676

247. John K. Vassiliou, Marc Hornbostel, Robin Ziebarth and F. J. Disalvo, Synthesis and properties of NdNiO₃ prepared by Low-Temperature Methods, 81, 208-216, 1989
248. N. Okasha, structural characterization and magnetic properties of Zn_{1-x}Cu_xCr_{0.8}Fe_{1.2}O₄: (0.1 ≤ x ≤ 0.9), Mater. Chem. Phys., 84, 63-70, 2004.
249. N. Fradette and B. Marsan, Surface studies of Cu_xCo_{3-x}O₄ electrodes for the electrocatalysis of oxygen evolution, J. Electrochem. Soc., 145, 2320-2327, 1998.
250. E. Gileadi, Electrode Kinetics, VCH Publishers Inc., New York, p-151, 1993.
251. J.G.N. Thomas, Kinetics of electrolytic hydrogen evolution and the adsorption of hydrogen by metals, Trans Faraday Soc, 57, 1603-1611, 1961.
252. R. Parsons, Rate of electrolytic hydrogen evolution and the heat of adsorption of hydrogen, Trans Faraday Soc, 54, 1053-1064, 1958.
253. B.E Conway and E. Gileadi, Kinetic theory of Pseudo-capacitance and electrode reactions at appreciable surface coverage, Trans Faraday Soc, 58, 2493-2509. 1962.
254. B.E Conway and M. Salomon, Electrochemical reaction orders: Applications to the hydrogen and oxygen evolution reactions, Electrochim Acta, 9, 1599-1615, 1964.
255. S.K Tiwari, K.L Anitha and R.N Singh, Studies on the electrocatalytic properties of some austenitic stainless steels for oxygen evolution in alkaline medium, J. Electroanal. Chem. 391, 263-274, 1991.

Books and Thesis Consulted:

1. Gileady, E, Kirowa-Eisner, E and Penciner, J, "Interfacial Electrochemistry, An Experimental Approach", Addison-Wesley Publishing Company, INC. London, 1975.
2. Eliezer Gileady, "Electrodes Kinetics", VCH Publishers, INC., United States of America, 1993.
3. Jacek Lipkowski and Philip N Ross, "The Electrochemistry of Novel Materials", VCH Publishers, INC., United States of America, 1994.
4. Sergio Trasatti, "Electrodes of Conductive Metallic Oxides", Part A, Elsevier Scientific Publishing Company, Amsterdam, 1980.
5. Sergio Trasatti, "Electrodes of Conductive Metallic Oxides", Part A, Elsevier Scientific Publishing Company, Amsterdam, 1981.
6. H. Wendt, "Electrochemical Hydrogen Technologies", Elsevier Scientific Publishing Company, Amsterdam, 1990.
7. JO`M Bockris and AKN Reddy, "Modern Electrochemistry" Vol.2, Plenum Press, New York, 1970.
8. I Vogel, "Quantitative Inorganic Analysis" Fourth Edition, ELBS, London, 1978.
9. Lawrence H Van Vlack, "Elements of Material Science and Engineering", Sixth Edition, Addison-Wesley Publishing Company, INC., Second ISE Reprint, 1998.
10. DD Eley, H Pines and PB Weisz, "Advances in Catalysis", Vol.36, Academic Press, INC., United States of America, 1989.
11. LG Tejuca, JLF Fierro and JM Tascon, "Advances in Catalysis", Vol.27, Academic Press, INC., New York, 1989.
12. RG Compton, "Electrode Kinetic Reactions", Elsevier Publishing Company, Amsterdam, 1987.

Bibliography

13. RG Compton, "Comprehensive Chemical Kinetics", Vol. 27, Elsevier Publishing Company, Amsterdam, 1987.
14. Andrzej Wieckowski, "Interfacial Electrochemistry Theory, Experimental and Applications", Marcel Dekker, INC., New York, Basel, 1999.
15. Pierluigi Barbaro and Claudio Bianchini, "Catalysis for Sustainable Energy Production", Wiley-VCH, 2009.
16. Thesis entitled "Preparation and Characterization of transition metal mixed oxides for their applications as anode in alkaline water electrolysis", submitted by Dr. Amit Singh, BHU, Varanasi.
17. Thesis entitled "Synthesis and characterization of transition metal mixed oxides for oxygen evolution in alkaline medium", submitted by Dr. Mridul Kumar, BHU, Varanasi.
18. Thesis entitled "Study of some binary and ternary spinel-type oxide electrodes for electrocatalysis of oxygen evolution in alkaline medium" submitted by Dr. Ritu Yadav, University of Lucknow, Lucknow.