

B I O D A T A

1. Name : *Dr. RAKESH CHANDRA AGRAWAL*

Designation : Professor

Address : Solid State Ionics Research Laboratory, School of Studies in Physics,
Pt. Ravishankar Shukla University, Raipur-492010, C. G., INDIA

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Date of Birth : 16 / 09 / 1951

Travel Document : Passport No. G7856882, Issued at: Raipur, India, Validity: 23 / 04 / 2018

Marital Status : Married with 3 children (2 daughters, 1 Son)
Mrs. Madhulika Agrawal (Wife, DOB: 12/09/1959) Pass. No. M0699246, Issued at:
Raipur, India, Validity: 01/09/2024

2. Educational Qualification (B. Sc. on wards):

Degree	Institution	Subjects	Year
B.Sc.	Pt. R. S. U., Raipur (M.P.)	Phy., Chem., Maths, Hindi, English	1972
M.Sc.	-----do-----	Physics (Solid State)	1974
Ph. D.	-----do-----	Solid State Ionics/ Material Science	1980
Ph. D. Thesis Title: “Electrical Properties of Some Superionic Solids”			

3. Research/Teaching Experience:

Duration	Institution	Designation	Nature of Work
1975-76	Pt. J. L. N. Arts & Sci. College, Bemetara	Lecturer	Teaching UG Courses
1976-79	Phy. Dept., R. S. U. Raipur	UGC-JRF	Ph. D. Scholar Solid State Ionics
1980-81	Phy. Dept., BHU, Varanasi	SRF/PDF	Research continued in the same field
1982-87	Phy. Dept., Al-Fateh Uni., Tripoly (Libya)	Lecturer	Teaching+Research in the same field
1988-93	SoS in Physics, Pt. R. S. U. Raipur	Lecturer	Teaching+Research in the same field
1993-98	-----do-----	Sr. Lecturer	Teaching+Research in the same field
1998-03	-----do-----	Reader (CAS) (July 1998)	Teaching+Research in the same field
2003- 1999-2001	-----do----- Dept. of General Sciences, Yanbu Industrial College, Yanbu (Kingdom of Saudi Arabia)	Professor (Sept.03) Asst. Professor	Teaching+Research in the same field Teaching + Research in the same field

¹ On lien from 10 Sept.1999 to 20 June 2001

4. Principal Investigators For Research Projects:

- (1) CSIR sponsored Project (Oct. 1990- Oct. 1994): “Investigation on Solid State Power Sources Using Superionics Conductors in Glassy Phase” (Completed)
- (2) UGC sponsored Project (Nov. 1991- Nov. 1995): “Electrical and Electrochemical Properties of Composite Electrolytes” (Completed)
- (3) MPCOST sponsored Project (Jan. 1995- Dec. 1997): “Solid Electrolyte- Materials and Applications” (Completed)
- (4) Departmental Project under (DST, FIST) (2004-2010) (Completed).
- (5) CGCOST Sponsored Project (2007-2010) “Fast Ion Conducting Systems: Synthesis, Characterization and Solid State Electrochemical Device Application” (Completed).
- (7) CSIR Sponsored Project: (2009-2013) “Ion Conducting Electroactive Polymers: Synthesis, Characterization and Electrochemical Device Prospects” (Completed).
- (8) CGCOST Project: Effect of High-Energy Ball-Milling and Study of Nano-ionic Effect in Dry Polymer Electrolytes (Ongoing).

5. Research Specialization: Solid State Ionics/ Superionic Solids/ Materials Science.

6. No. of Ph. D. students: 14 (10 awarded Ph. D. degree, 4 Registered for Ph.D)

1. Dr. R. K. Gupta (1997), Asstt. Prof., Dept. of Optometry, College of Applied Medical Science, Saudi Arabia.
2. Dr. Ranveer Kumar (1997), Associate Professor, Physics Dept., Sagar University, Sagar
3. Dr. Mohan L. Verma (2000), Professor & Head, Shankaracharya Engg. College, Bhilai
4. Dr. M. L. Verma (2003), Associate. Prof., Govt. PG Girls College, Raipur.
5. Dr. Alok Bhatt (2008), Sr. Lecturer, M.P. Christian College of Engg. & Tech. Bhilai.
6. Dr. Angesh Chandra (2009), Lecturer, Shri Shankaracharya College of Professional management & Technology, Raipur
7. Dr. G. P. Pandey (2009), Research Associate, Dept. of Chemistry, Kansas state University, USA
8. Dr. Y. K. Mahipal (2011), Post Doctoral Research Fellow, University of Malaya, Kualalumpur.
9. Dr. Dinesh Kr. Sahu (2013), Asso. Prof., REC-Raipur.
10. Dr. Rehana Ashrafi (2015), Post Doctoral

7. List of Publications: 106, See Annexure-I

8. Participation in various National/ Int. conferences: See Annexure-II

9. Acted as:

Resource Person at various Refresher Courses/ Workshops; Invited Speaker/ Chairman of Scientific Sessions at various Nat./ Int. Conferences; Member of various Scientific/ Advisory/ Organizing Committees;

Life Member of various Nat./ Int. Scientific Societies/ Associations viz Int./Asian/Indian Solid State Ionic Society, Indian Science Congress, Materials Science Research (India).

Review Examiner for various Nat. / Int. Journals etc.

10. Sectional President: 94th Indian Science Congress, Section of Materials Science, Jan. 3-7, 2007, Annamalainagar, (India).

11. Associateship Awarded:

UGC Visiting Associateship : Awarded for two years (1993-94, 94-95)

NISA Life Associateship : National Institute of Advanced Studies, Bangalore.

12. Refresher/ Orientation Course Attended:

Course on “Neutron as a probe of condensed matter”, Univ. of Goa and BARC, April 20-May 4, 1990.

3rd NIAS Course on “An integrated approach to knowledge and information”, Nat. Inst. for Advanced Studies, IISc. Campus, Bangalore (India), July 3-29, 1995.

Refresher Course on “Contemporary Physics”, Institute of Physics and Electronics, Barkatullah University Bhopal, July 21-August 10, 1999.

13. Designing and Fabrication:

A high speed (~3500 rpm) Chrome plated Steel- Twin Roller Quencher, for low to very low temperature quenching for the preparation of materials/ alloys in glassy/amorphous/vitreous phase. Special electrode holder for thermoelectric power (TEP) measurement. Vibratory Ball-Milling Apparatus for mechano-chemical synthesis in Glassy electrolyte phase.

Annexure-I

LIST OF PUBLICATIONS OF PROF. R. C. AGRAWAL

Review Articles

1. "Solid State Battery - Prospects and Limitation", S. Chandra & R.C. Agrawal, 'Nat. Acad. Sci., India, -Golden Jubilee Commemoration Volume' (Ed) U.S. Srivastava (Naya Prokash, Kolkata, 1980) p.429.
2. "Superionic Solids: Composite Electrolyte Phase - An overview", R. C. Agrawal & R. K. Gupta, *J. Mater. Sci.* **34**, 1131 (1999) (UK).
3. "DC polarization technique: An experimental tool in the study of ion conductors", R.C. Agrawal, *Ind. J. Pure & Appl. Phys.* **37**, 294 (1999) (India).
4. "Composite Electrolyte Materials: Prospects and Technological Potentials", R.C. Agrawal, Presidential Address, Materials Science, Jan. 3-7, 2007, 94th ISCA, Annamalai (India).
5. "Solid State Batteries Based on Solid Electrolyte Materials", R.C. Agrawal, Proc. National Conference on Application of Materials Science in Service of Society, 5-6 Feb. 2008, Allahabad (India).
6. "Solid Polymer Electrolytes: Materials designing and All-Solid-State Battery Applications-An Overview", R. C. Agrawal and G. P. Pandey, *J. Phys. D: Appl. Phys.*, **41** (2008) 223001

Other Research Papers

7. "A thin film solid state battery using superionic solid $\text{NH}_4\text{Ag}_4\text{I}_5$ " S. Chandra, R.C. Agrawal & R.K. Pandey, *Nat. Acad. Sci. Lett.* **1**, 112 (1978), (India).
8. "Superionic solid film II: Preparation and electrical conductivity of anion substituted silver iodide based superionic solid $\text{Ag}_7\text{I}_4\text{PO}_4$ ", S. Chandra, R. C. Agrawal & R. K. Pandey, *Phys. Stat. Sol.(a)*, **57**, 299 (1980), (Germany).
9. "Superionic solid film III: Preparation and electrical conductivity of cation substituted silver iodide based superionic solid $\text{NH}_4\text{Ag}_4\text{I}_5$ ", S. Chandra, J. N. Sharma, V. K. Mohabey & R. C. Agrawal, *J. Phys. D (Applied Physics)*, **13**, 495 (1980), (UK).
10. "Superionic solid film IV: Cation substituted AgI based superionic solid $[(\text{CH}_3)_4\text{N}]_2\text{Ag}_{13}\text{I}_{15}$ " S. Chandra & R. C. Agrawal, *J. Phys. D (Appl. Phys.)*, **13**, 1665 (1980), (UK).
11. "Surface diffusion coefficient of iodine in some superionic solid films" S. Chandra & R. C. Agrawal, *J. Phys. Soc. Jpn.* **48**, 2171 (1980) (Japan).
12. "Solar energy conversion using CdSe photo electrochemical cells with low cost substrates", S. Chandra, R. K. Pandey & R. C. Agrawal, *Solar Cells* **1**, 367 (1979-80) (USA).
13. "Solar energy conversion by photoelectrochemical cells using chemical bath deposited CdS films" S. Chandra, R. K. Pandey & R. C. Agrawal, *J. Phys. D (Applied Physics)* **13**, 1757 (1980) (UK).
14. "Photolysis of $\text{M}\text{Ag}_4\text{I}_5$ superionic films", S. Chandra, R. C. Agrawal & N. Singh, *Solid State Ionics* **2**, 315 (1981), (The Netherlands).
15. "Characterization of electroco-deposited films of $\text{M}\text{Ag}_4\text{I}_5$ ", R. C. Agrawal, N. Singh & S. Chandra, *Solid State Ionics* **9/10**, 1455 (1983), (The Netherlands).
16. "Transport properties of a cationic superionic conductor" M. Saleem, M. Kadari & R. C. Agrawal, *Phys. Stat. Sol. (a)* **99**, 91 (1987), (Germany).
17. "Electrical conduction in superionic material $[(\text{Ag}_2\text{Se})_{0.45}(\text{AgI})_{0.26}(\text{HgI}_2)_{0.24}]$ ", M. Saleem, S. B. Halim & R. C. Agrawal, *Phys. Stat. Sol.(a)* **101**, 102 (1987), (Germany).

18. "Ag⁺ mobility in AgI & AgCl by transient ionic current (TIC) technique", R. C. Agrawal, K. Kathal & R. K. Gupta, in "Solid State Ionics - Materials and Applications" (Eds.) B. V. R. Chowdari, S. Chandra, S. Singh and P.C. Srivastava (World Scientific, Singapore, 1992) p.363.
19. "Solid state battery using all halide glassy electrolytes: 0.45AgI:0.35AgCl:0.20CsCl", R. C. Agrawal, K. Kathal, R. K. Gupta & M. Saleem, *ibid* (1992) p. 641.
20. "Investigation on Poly (Ethylene Oxide) based polymer electrolyte complexed with AgNO₃", S. Chandra, S. A. Hashmi, M. Saleem & R. C. Agrawal, *Solid State Ionics* 67, 1 (1993), (The Netherlands).
21. "Estimation of energies of Ag⁺ ion formation and migration using transient ionic current technique", R.C. Agrawal, K. Kathal & R. K. Gupta, *Solid State Ionics* 74, 137 (1994) (The Netherlands).
22. "Ionic transport in (AgI: AgCl) mixed system", R.C. Agrawal, R.K. Gupta, R. Kumar & A. Kumar, *J. Mater. Sci.* 29, 3673 (1994), (UK).
23. "Investigation on transport properties of the silver ion conducting composite electrolyte", R.K. Gupta & R. C. Agrawal, *Solid State Ionics* 72, 314 (1994) (The Netherlands).
24. "Investigation on ionic transport properties and solid state battery applications of a new Ag⁺ ion conducting glass system: x[0.75AgI:0.25AgCl]:(1-x)[Ag₂O:B₂O₃]", R.C. Agrawal & R. Kumar, *J. Phys. D (Appl. Phys.)* 27, 2431 (1994) (UK).
25. "Investigation on transport properties of mixed glass system: 0.75[0.75AgI:0.25AgCl]:0.25[Ag₂O: CrO₃]", R.C. Agrawal & R. Kumar, in : "Solid State Ionic Materials" (Eds.) B.V.R. Chowdari, M. Yahaya, B. Talib and M. M. Salleh (World Scientific, Singapore, 1994) p. 295.
26. "[0.75AgI: 0.25AgCl] quenched system: A better choice as host compound in place of AgI to prepare Ag⁺ ion conducting superionic glasses and composites", R. C. Agrawal, R. Kumar, R. K. Gupta & M. Saleem, *J. Non-Cryst. Solids* 181, 110 (1995) (The Netherlands).
27. "Transport properties and battery discharge characteristic studies on (1-x)[0.75AgI:0.25AgCl]:xAl₂O₃ composite electrolyte system", R.C. Agrawal & R. K. Gupta, *J. Mater. Sci.* 30, 3612 (1995) (UK).
28. "Studies on ionic transport properties of a new Ag⁺ ion conducting composite electrolyte system: (1-x)[0.75AgI:0.25AgCl]:xSnO₂", R.C. Agrawal & R.K. Gupta, *Bull. Mater. Sci.* 19, 573 (1996) (India).
29. "Fast Ag⁺ ion conducting mixed glass system: x[0.75AgI:0.25AgCl]:(1-x)[Ag₂O:CrO₃] - Transport property and battery discharge characteristics studies", R. C. Agrawal & R. Kumar, *J. Phys. D (Appl. Phys.)* 29, 156 (1996), (UK).
30. "Transport studies on a new fast silver ion conducting system: 0.7[0.75AgI:0.25AgCl]: 0.3[y(Ag₂O): (1-y)B₂O₃]", R. C. Agrawal, R. Kumar & A. Chandra, *Solid State Ionics* 84, 51 (1996) (The Netherlands)
31. "Studies on [(AgI:AgCl):Ag₂O:CrO₃] silver ion conducting solid electrolyte" R.C. Agrawal & R. Kumar, *Bull. Electrochem.* 12, 187 (1996) (India)
32. "Ionic drift velocity and mobility measurement on a quenched [0.75AgI:0.25AgCl] mixed system or solid solution", R. C. Agrawal, R. K. Gupta & R.K. Pandey, in : "Solid State Ionics - New Developments" (Eds.) B. V. R. Chowdari, M. A. K. L. Dissanayake and M. A. Careem (World Scientific, Singapore, 1996) p. 481.
33. "Thermoelectric power study on a new Ag⁺ ion conducting composite electrolyte system: 0.8[0.75AgI: 0.25AgCl]:0.2SnO₂" M. Saleem, R.K. Gupta & R.C. Agrawal, *ibid* (1996) p. 487.
34. "Temperature dependence of transference number and ionic drift velocity on some silver halide systems", R.C. Agrawal, R. Kumar & R.K. Pandey, *ibid* (1996) p. 493.

35. "Transport property studies on Ag⁺ ion conducting composite electrolyte system (1-x)AgI: xSnO₂", R.K. Gupta, R.C. Agrawal & R.K. Pandey, *ibid* (1996) p. 499.
36. "Detailed investigation of temperature dependence of ionic transport parameters of a new composite electrolyte system: (1-x)[0.75AgI:0.25AgCl]:xSnO₂", R. C. Agrawal & R. K. Gupta, *J. Mater. Sci.* **32**, 3327 (1997), (UK).
37. "Studies of ionic transport properties on a new Ag⁺ ion conducting composite electrolyte system: (1-x)[0.75AgI:0.25AgCl]: xSiO₂", R.C. Agrawal, Mohan L. Verma & R.K. Gupta, *J. Phys. D: (Appl. Phys.)* **31**, 2854 (1998) (UK).
38. "Thermoelectric power and battery discharge characteristic studies on a new silver ion conducting composite electrolyte system", R.C. Agrawal, Mohan L. Verma, R. K. Gupta & S. Thaker, in: "Solid State Ionics - Science & Technology" (Eds.) B. V .R. Chowdari, K. Lal, S.A. Agnihotry, N. Khare, S. S. Sekhon, P.C. Shrivastava and S. Chandra (World Scientific, Singapore, 1998) p. 465.
39. "Glass former - compositional dependent conductivity studies on a new Ag⁺ ion conducting glass system: 0.7[0.75AgI:0.25AgCl]:0.3[Ag₂O:{xB₂O₃:(1-x)MoO₃}]", R.C. Agrawal, R. Kumar & M.L. Verma, *ibid.* (1998) p. 257.
40. "Estimation of mobile ion concentration in some silver ion conducting solid electrolyte systems by dc polarization/depolarization studies" R.C. Agrawal, Mohan L. Verma, R. K. Gupta, R. Kumar, M. L. Verma & S.K. Pandey, *ibid.* (1998) p.127.
41. "Estimation of ionic drift velocity on some fast Ag⁺ ion conducting systems", R.C. Agrawal, R. Kumar & R.K. Gupta, *Mater. Sci. & Engg. B* **57**, 46 (1998) (The Netherlands).
42. "Studies of polarization/self-depolarization and electret - type effect on AgI", R. C. Agrawal, R. K. Gupta & Mohan L. Verma, *Ionics* **4**, 33 (1998) (Germany).
43. "Polarization/self-depolarization studies on Ag⁺ ion conducting quenched [0.75AgI:0.25AgCl] mixed-system/solid-solution", R.C. Agrawal, R. K. Gupta, Mohan L. Verma & A.R. Sharma, *Ind. J. Pure & Appl. Phys.* **37**, 235 (1999) (India).
44. "Studies on persistent polarization/memory-type effect in Ag⁺ ion conducting quenched [0.75AgI: 0.25AgCl] mixed-system/solid-solution", R. C. Agrawal, Mohan L. Verma & R. K. Gupta, *ibid.* **37**, 334 (1999) (India).
45. "Studies on polarization/self-depolarization studies on Ag⁺ ion conducting borate glass system: 0.7[0.75AgI:0.25AgCl]:0.3[Ag₂O: B₂O₃]", R.C. Agrawal, R. Kumar, M. L. Verma & P. Dasgupta, *ibid.* **37**, 338 (1999) (India).
46. "Characterization of basic transport parameters in a new fast Ag⁺ ion conducting composite electrolyte system : (1-x)[0.75AgI:0.25AgCl]:xZrO₂", R.C. Agrawal, Mohan L. Verma, R. K. Gupta & S. Thaker, *Solid State Ionics* **136-137**, 473(2000) (The Netherlands)
47. "Thermoelectric power and battery discharge characteristic studies on a new Ag⁺ ion conducting 2-phase composite electrolyte system: 0.9[0.75AgI: 0.25AgCl]: 0.1ZrO₂", R. C. Agrawal, Mohan L. Verma, R. K. Gupta & S. Thaker, in: "Ion Conducting Materials: Theory and Application" (Eds.) A. R. Kulkarni and P. Gopalan (Narosa Pub. House, New Delhi, 2001) p.220 (India)
48. "Solid state battery discharge characteristic studies on a new Ag⁺ ion conducting glass system : 0.7[0.75AgI:0.25AgCl]: 0.3[Ag₂O:{0.7B₂O₃: 0.3MoO₃}]", R. C. Agrawal, M. L. Verma, R. K. Gupta & R. Kumar, in: "Ion Conducting Materials: Theory and Application" (eds.) A. R. Kulkarni and P. Gopalan (Narosa Pub. House, New Delhi, 2001) p. 176 (India).

49. "Transport property and mixed former effect studies on a new Ag^+ ion conducting glass system: $0.7[0.75\text{AgI}:0.25\text{AgCl}]:0.3[\text{Ag}_2\text{O}:\{x\text{B}_2\text{O}_3:(1-x)\text{MoO}_3\}]$ ", R.C. Agrawal, M.L. Verma, R. K. Gupta & R. Kumar, *J. Phys. D (Appl. Phys.)* **35**,810 (2002) (U.K.).
50. "Ion transport and solid state battery studies on a new silver molybdate superionic glass system: $x[0.75\text{AgI}:0.25\text{AgCl}]:(1-x)[\text{Ag}_2\text{O}:\text{MoO}_3]$ ", R.C. Agrawal, M.L. Verma, R. K. Gupta, R. Kumar & R. M. Chandola *Ionics* **8**, 426 (2002) (Germany).
51. "Studies on a new silver molybdate glass system: $x[0.75\text{AgI}:0.25\text{AgCl}]:(1-x)[\text{Ag}_2\text{O}:\text{MoO}_3]$ ", R. C. Agrawal, M. L. Verma, R.K. Gupta and A. Bhatt, in: "Solid State Ionics: Proceedings, 5th NCSSI, Nagpur, 15-17 February, 2002" (Eds) K Singh and S.S. Bhoga, p. 58.
52. "Investigation on a new Ag^+ ion conducting two-phase composite electrolyte system: $x[0.75\text{AgI}:0.25\text{AgCl}]:(1-x)\text{Fe}_2\text{O}_3$ ", R.C. Agrawal, R. K. Gupta, C.K. Sinha and R. Kumar, *ibid.*, p. 122.
53. "Polarization/ Self – depolarization Studies on Some Fast Ag^+ Ion Conducting Glasses", R. C. agrawal, M. L. Verma & A. Bhatt, in: "Solid State Ionics: Trends in the New Millennium" (Eds) B.V.R. Chowdari, S.R. S Prabaharan, M. Yahaya, I. A. Talib (World Scientific, Singapore, 2002) p.735.
54. "Solid State Battery Discharge Characteristic Studies on Some New Ag^+ Ion Conducting Glasses", R. C. Agrawal, M. L. Verma & C. K. Sinha, *ibid* (2002) p.171.
55. "Investigation on silver tungstate glass: $x[0.75\text{AgI}:0.25\text{AgCl}]:(1-x)[\text{Ag}_2\text{O}:\text{WO}_3]$ -A new Ag^+ ion conducting solid electrolyte system", R. C. Agrawal, M. L. Verma, A. Bhatt and R. Kumar, *Proc. ISAEST-VII*, 2003, Vol. II., p.D170.
56. "Discharge Characteristic Study on Solid State Battery using Composite Solid Electrolyte System: $0.8[0.75\text{AgI}:0.25\text{AgCl}]:0.2\text{Fe}_2\text{O}_3$ ", R.C. Agrawal, Chetan K. Sinha, Mohan L. Verma, *ibid* (2003) p.D174.
57. "Electrical and electrochemical properties of a new silver tungstate glass system: $x [0.75\text{AgI} : 0.25\text{AgCl}]: (1-x)[\text{Ag}_2\text{O}:\text{WO}_3]$ "- R. C. Agrawal, M. L. Verma and R. K. Gupta, *Solid State Ionics* , **171**, 199(2004) (The Netherland).
59. "Electrical Properties of a new Ag^+ ion conducting glass system: $x[0.75\text{AgI}:0.25\text{AgCl}]:(1-x)[\text{Ag}_2\text{O}:\text{P}_2\text{O}_5]$ " - R. C. Agrawal, R. K. Gupta, A. Bhatt, M. L. Verma and Angesh Chandra, *Ionics* **10**, 126 (2004) (Germany).
60. "Transport properties and battery discharge characteristics of Ag^+ ion conducting electrolyte system: $(1-x)[0.75\text{AgI}:0.25\text{AgCl}]:x\text{Fe}_2\text{O}_3$ " -R. C. Agrawal, R. K. Gupta, C. K. Sinha, R. Kumar and G. P. Pandey, *Ionics* **10**, 113 (2004) (Germany).
61. "A novel liquid –solid lead acid secondary battery: Study of charge-discharge behavior", R.C Agrawal, G. P. Pandey, D. Singh and M. L. Verma, *Indian J. Phy.*, **79** (2005), 711.
62. "Transport property studies on a new silver ternary glass electrolyte System: $x[0.75\text{AgI}:0.25\text{AgCl}]:(1-x)[\text{Ag}_2\text{O}:\text{V}_2\text{O}_5]$ "- R. C. Agrawal, Alok Bhatt, Angesh Chandra, Puja Diwan, M.L. Verma, *Indian J. Phy.*, **79** (2005)737.
63. "Study of ion transport behavior in CeO_2 dispersed fast ion conducting composite electrolyte system" – R. Kumar, R. K. Nagarch, R. Sharma and R. C. Agrawal, *Ind. J. Phys.*, **79** (2005), 687.
64. "Ion transport studies on a new silver ion conducting lead borate glass system: $x[0.75\text{AgI}:0.25\text{AgCl}]:(1-x)[\text{Ag}_2\text{O}:(\text{PbO}:\text{B}_2\text{O}_3)]$ "- Ranveer Kumar, Nidhi B. Jain, R. K. Nagarch and R. C. Agrawal, *Ind. J. Phys.*, **79** (2005), 745.
65. "Study of Ionic Polarate/ Electret Type effects in some Ion Conducting Polymers"- R. C. Agrawal, G. P. Pandey, D. Singh and M. L. Verma, *Proc. Electroactive Polymers: Materials & Devices* **1** (2006) 213.
66. "Investigation on Electrical and Electrochemical Properties of Nano Composite Polymer Electrolyte Films" – R. C. Agrawal, G. P. Pandey (*Proc-Nano 2005, Int. Conf. on Nano-materials*, p. 291, 13-15 July, 2005, Sivakasi, Tamil Nadu, India)

67. "Ion transport behavior in a new fast Ag⁺ ion conducting composite electrolyte system: 0.85[0.75AgI:0.25AgCl]: 0.15CeO₂"- R. K. Nagarch, R. Kumar, R.C. Agrawal, J. Non-crystalline Solids, 352 (2006) 458.
68. "Transport property and structural characterization studies on (1-x) [0.75AgI:0.25AgCl]: xTiO₂ conducting composite electrolyte system"- R. K. Nagarch, R. Kumar, R.C. Agrawal, J. Non-crystalline Solids, 352 (2006) 450.
69. "Investigations on electrical and electrochemical properties of Ag⁺ ion conducting quaternary solid electrolyte systems: x [0.75AgI:0.25AgCl] : (1-x) RbI" - R. C. Agrawal, Angesh Chandra, Alok Bhatt, Y.K. Mahipal, J. Phys. D: Applied Physics 40 (2007) 4714.
70. "Electrochemical Cell Performance Studies on All-Solid State Battery using Nano-composite polymer Electrolyte Membrane" - R. C. Agrawal, S.A. Hashmi and G. P. Pandey, Ionics 13 (2007) 295 (Germany).
71. "Ion transport and electrochemical cell performance studies on hot-press-synthesized Ag⁺ ion conducting electroactive polymeric membranes: (1-x) PEO : x [0.7(0.75AgI:0.25 AgCl):0.3 MI]" - R.C. Agrawal, Angesh Chandra, J. Phys. D: Applied Physics 40 (2007) 7024.
72. "Cell-potential discharge performance studies on solid state batteries based on newly synthesized fast Ag⁺ ion conducting vanadate/ phosphate glass electrolytes" - R.C. Agrawal, Angesh Chandra, Alok Bhatt, Y.K. Mahipal, Dinesh Sahu, Proc. 52nd DAE Solid State Physics Symposium 52 (2007) 509.
73. "Synthesis and ion transport studies on a hot-pressed Ag⁺ ion conducting solid polymer electrolytes: (1-x) PEO : x [0.7(0.75AgI:0.25 AgCl):0.3 RbI]" - R.C. Agrawal, Angesh Chandra, Alok Bhatt, Y.K. Mahipal, Proc. Electroactive Polymers: Materials & Devices 2 (2007) 395.
74. "Investigations on ion conducting behavior in solid polymer electrolyte membranes: (PEO: MgCl₂) synthesized by a novel hot-press technique" – R.C. Agrawal, S.A. Hashmi, G.P. Pandey, Proc. Electroactive Polymers: Materials & Devices 2 (2007) 309.
75. "Experimental investigations on a proton conducting nanocomposite polymer electrolyte" – G.P. Pandey, R.C. Agrawal, S.A. Hashmi, J. Phys. D: Applied Physics 41 (2008) 514.
76. "Ion Transport and Battery Discharge Characteristic Studies on Hot-press synthesized Ag⁺ Ion Conducting Nano Composite Polymeric Electrolyte: (1-x) [90 PEO: 10 AgNO₃]: x SiO₂"- R.C. Agrawal, Angesh Chandra, Alok Bhatt, Y.K. Mahipal, New. J. Physics 10 (2008) 043023.
77. "Hot-press synthesized polyethylene oxide based proton conducting nanocomposite polymer electrolyte dispersed with SiO₂ nanoparticles" - G. P. Pandey, S. A. Hashmi, R. C. Agrawal, Solid State Ionics 179 (2008) 543.
78. "Nano-composite polymer electrolytes: Materials and application aspects" – R.C. Agrawal, 'Proc. 11th Asian Conf. on Solid State Ionics: New Materials for Pollution Free Energy Devices' (Eds) B.V.R. Chowdari, (Macmillan India Ltd, 2008) p. 143.
79. "Study of Ion Transport Phenomenon in a new Mg⁺⁺ ion conducting solid polymer electrolyte: PEO: Mg (ClO₄)₂ – Synthesized by a Novel Hot-press Method" - R.C. Agrawal, Angesh Chandra, Dinesh Sahu, Alok Bhatt, 'Proc. 11th Asian Conf. on Solid State Ionics: New Materials for Pollution Free Energy Devices' (Eds) B.V.R. Chowdari, ibid (2008) p. 555.
80. "Electrical Property Studies on a Novel Hot-press-synthesized Na-Ion Conducting Polymeric Membranes: (1-x) PEO: x NaNO₃" - R.C. Agrawal, Angesh Chandra, Y.K. Mahipal, Asha Singh, 'Proc. 11th Asian Conf. on Solid State Ionics: New Materials for Pollution Free Energy Devices' (Eds) B.V.R. Chowdari, ibid (2008) p. 561.
81. "A Novel Hot-press/ dry Casted Solid Polymer Electrolyte (SPE) Films: (1-x) PEO: x KOH; Characterization of Ion Transport Behaviour" - R.C. Agrawal, Angesh Chandra, Y.K. Mahipal, Beena R., 'Proc. 11th Asian Conf. on Solid State Ionics: New Materials for Pollution Free Energy Devices' (Eds) B.V.R. Chowdari, ibid (2008) p. 567.

82. "Investigations on Hot-press-synthesized Nano Composite Polymer Electrolyte (NCPE) Membranes: (1-x) [70PEO:30KIO₃]: x SiO₂" - R.C. Agrawal, Angesh Chandra, Y.K. Mahipal, Dinesh Sahu, Kamlesh Pandey, 'Proc. 11th Asian Conf. on Solid State Ionics: New Materials for Pollution Free Energy Devices' (Eds) B.V.R. Chowdari, ibid (2008) p. 573.
83. "Characterization of ion transport property and study of solid state battery discharge performance on newly synthesized Ag⁺ ion conducting quaternary solid electrolyte systems: x [0.75AgI: 0.25AgCl] : (1-x) KI" - R. C. Agrawal, Angesh Chandra, Alok Bhatt, Y.K. Mahipal, European Physical Journal: Applied Physics, European physical journal **43** (2008) 209.
84. "Ion transport property studies on hot – press synthesized ion conducting solid polymer electrolytes: (1-x) PEO: x NaPO₃" Proc. 53rd DAE Solid State Physics Symposium (2008) p. 951.
85. "Magnesium ion-conducting gel polymer electrolytes dispersed with nanosized magnesium oxide", Journal of Power sources **190** (2009) 563.
86. "Ion transport property studies on PEO–PVP blended solid polymer electrolyte membranes" Journal of Physics D: Appl. Physics **42** (2009) 135107.
87. "Materials and ion transport property studies on hot-press casted solid polymer electrolyte membranes: [(1-x) PEO: x KIO₃], Solid State Ionics 192 (2011) 6-8.
88. Study of Electrical and Electrochemical Behaviour on Hot-press Synthesized Nano-Composite Polymer Electrolyte (NCPE) membranes: [(70PEO: 30 KNO₃) + x SiO₂]" R. C. Agrawal, Y. K. Mahipal, Dinesh Sahu, J. Electrochemical Science. 6 (2011) 867-881.
89. "Ion transport characterization and cell potential discharge studies on hot-press synthesized solid polymer electrolyte: (PEO: NaNO₃), R. C. Agrawal, Y. K. Mahipal, Dinesh Sahu, J. Current Applied Physics, (under review).
90. Magnesium ion-conducting gel polymer electrolytes dispersed with fumed silica for rechargeable magnesium battery application, G. P. Pandey & R. C. Agrawal, S. A. Hashmi, J. Solid State Electrochem. 15 (2011) 2253-2264.
92. "Electrical and electrochemical properties of magnesium ion conducting composite gel polymer electrolytes", G. P. Pandey, R. C. Agrawal, S. A. Hashmi, J. Phys. D: Appl. Phys. 43 (2010) 255501.
93. "Study of ion transport behaviour in a mechanochemically synthesized silver halide mixed composite system: [0.75AgI: 0.25 AgCl], R. C. Agrawal, Y. K. Mahipal, Dinesh Sahu, Geeta Shrivastava, J. Non-Crystalline Solids, 357 (2011) 3670-3674.
94. "Magnesium ion-conducting gel polymer electrolytes dispersed with fumed silica for rechargeable magnesium battery application" G. P. Pandey & R. C. Agrawal & S. A. Hashmi, J Solid State Electrochem (2011) 15:2253–2264.
95. "Ion transport property and All-Solid-State battery Property Studies on Hot-press Casted Nano-Composite Polymer Electrolyte Membranes: [92PEO: 8NaI] + 5SiO₂", R. C. Agrawal, Y. K. Mahipal and Dinesh Sahu; Proc. 4th International Conference on Electroactive Polymers: Materials & Device Vol. IV, 2012 p. 109, Surajkund, New Delhi.
96. "Conductivity enhancement in TiO₂ Dispersed Nano-Composite Polymer Electrolyte (NCPE) films: (80PEO: 20 Mg (CF₃SO₃)₂) + x TiO₂ and study of all-solid-state cell performances", R. C. Agrawal, D. K. Sahu, Y. K. Mahipal, Rehana Ashrafi, Proc. 4th International Conference on Electroactive Polymers: Materials & Device Vol. IV, 2012 p. 321, Surajkund, New Delhi.
97. "Electrical and electrochemical properties on Mg²⁺ - ion conducting polymer electrolyte membranes" R.C.Agrawal*, Dinesh K. Sahu, Y.K. Mahipal, Rehana Ashrafi." Proc. 13th Asian Conf. on Solid State Ionics, 17-20 July, 2012, Japan' (world Scientific, 2012),

98. "Cell-Potential Discharge Performances on All-Solid-State Batteries Based on Polymer Electrolytes", R. C. Agrawal*, D. K. Sahu, Rehana Ashrafi, International Conference on Recent Trends in High-Tech Materials and Nanotechnology, Department of Applied Physics, RCET, Bilai, Chhattisgarh, (India) during February 8-9, 2013.
99. Ion Transport Characterization and Cell Potential Discharge Performance Studies on Hot-press Casted Solid Polymer Electrolyte (SPE): [(1-x) PEO: x Ag (ClO₄)] R. C. Agrawal*, Rehana Ashrafi, Dinesh K. Sahu, Y. K. Mahipal, Alok Bhatt, Indian J. Pure & Appl. Physics 51 (2013) 354.
100. "Investigation on Ion transport Property of Hot-press Cast Mg²⁺ -Ion Conducting Nano-Composite Polymer Electrolyte (NCPE) Membranes: Study of Effect of Active/ Passive Filler Particle Dispersal on Conductivity" R. C. Agrawal*, Dinesh K. Sahu, Y. K. Mahipal, Rehana Ashrafi. Indian J. Pure & Appl. Physics 51 (2013) 320.
101. "Investigation on Ion Transport Properties of Hot-Press Cast Magnesium Ion-Conducting Nano-Composite Polymer Electrolyte (NCPE) film: Effect of Filler Particle Dispersal on Room Temperature Conductivity" R.C. Agrawal,* Dinesh K. Sahu, Y.K. Mahipal, Rehana Ashrafi, J. of Materials Chemistry & Physics, 139 (2013) 410.
102. "Mg²⁺ - ion Conducting Polymer Electrolytes: Characterization of Materials Properties and All-Solid-State Battery Performance Studies" R. C. Agrawal,* Dinesh K. Sahu, J. Physical Science & Appl. 3 (2013) 6-14
103. "Electrical and electrochemical properties on Mg²⁺ - ion conducting polymer electrolyte membranes" R.C.Agrawal*, Dinesh K. Sahu, Y.K. Mahipal, Rehana Ashrafi. Proc. 13th Asian Conf. on Solid State Ionics, 17-20 July, 2012, Japan' (world Scientific, 2012),
104. "Magnesium Ion Conducting polymer Electrolytes : Potential Alternates as Non-lithium Electrolytes for All-Solid-State Battery applications." R.C.Agrawal.*, Proc Tech Connect World, 2,(2013) 650.
- 105 "Ion transport Property of Hot-press Cast Mg²⁺ -Ion Conducting Nano-Composite Polymer Electrolyte (NCPE) Membranes: Study of Effect of Active/ Passive Filler Particle Dispersal on Conductivity". R. C. Agrawal*, Dinesh K. Sahu, Y. K. Mahipal, Rehana Ashrafi, Indian J. Pure & Appl. Physics, .51 (2013) 320.
106. "Ag⁺ - Ion Conducting Nano-Composite Polymer Electrolytes (NCPEs): Synthesis, Characterization and All-Solid-Battery Studies". Rehana Ashrafi, Dinesh K. Sahu, R. C. Agrawal*. J. Non-crystalline solids, 391 (2014) 91.

Annexure-II

PAPER ACCEPTED/ PRESENTED AT NATIONAL/ INTERNATIONAL CONFERENCES

1. 47th Session, Nat. Acad. Sci. India, Bhopal (M. P.), March 1978. Paper entitled "Thin film state battery using superionic solid $\text{NH}_4\text{Ag}_4\text{I}_5$ " was presented.
2. 48th Session, Nat. Acad. Sci. India, Guahati (Assam), Oct. 1978. Paper entitled "Electrical conductivity of electrocodeposited film of superionic $\text{NH}_4\text{Ag}_4\text{I}_5$ " was presented.
3. 3rd Int. Meeting on Solid Electrolyte, Tokyo (Japan), Sept. 15-20, 1980. Paper entitled "Electrocodeposited films of some silver ion conductor" was accepted for presentation.
4. 49th Session, Nat. Acad. Sci. India, Nagpur (Maharatra), Nov. 1979. Paper entitled "Surface diffusion coefficient of iodine in some superionic solid films" was presented.
5. 50th Golden Jubilee Session, Nat. Acad. Sci. India, Allahabad (U. P.), Oct. 1980. (Participated)
6. 4th Int. Conf. on Solid State Ionics, Grenoble (France), July 4-8, 1983. Paper entitled "Characterization of electrodeposited films of $\text{M}_4\text{Ag}_4\text{I}_5$ " was presented (published)
7. 5th Int. Conf. on Solid State Ionics, Lake Tahoe (Truckee, USA), Aug. 18-24, 1985 (Participated)
8. 6th Int. Conf. on Solid State Ionics, Garmich (Germany), Sept. 6-11, 1987. Two research papers were accepted for presentation.
9. ENERGEX'88: International Energy Conference and Exposition, Tripoli (Libya), Nov. 25-30, 1988. Paper entitled "Gaseous hydrogen/oxygen fuel cell for energy conversion using solid state protonic conductor (SSPC)" accepted for presentation.
10. 7th Int. Conf. on Solid State Ionics, Hakone (Japan), Nov. 5-7, 1989. Paper entitled "Silver ion mobility in silver iodine by transient ionic current measurement" was accepted for presentation.
11. Attended a course on "Neutron as a Probe of Condensed Matter" University of Goa and BARC, Bombay, April 20 to May 4, 1990.
12. 8th Int. Conf. on Solid State Ionics, Lake Louise (Canada), Oct. 20-26, 1991. Paper entitled "Investigation in poly (ethylene oxide) based polymer electrolyte complexed with AgNO_3 ", was presented.
13. 3rd Asian Conf. on Solid State Ionics, Varanasi (India), Nov. 2-13, 1992.
Following two papers were presented at the conference (Nov. 9-13, 1992)
 - (i) "Ag⁺ ion mobility in AgI & AgCl by transient ionic current (TIC) technique".
 - (ii) "Solid state battery using all halide glassy electrolyte: $0.45\text{AgI}:0.35\text{AgCl}:0.2\text{CsCl}$ ".
14. 9th Int. Conf. on Solid State Ionics, The Hague (The Netherlands), Sept. 12-17, 1993. Two papers have been accepted for presentation:
 - (i) "Investigation on transport properties of Ag⁺ ion conducting composite electrolyte".
 - (ii) "Ionic conductivity in the $x [0.75\text{AgI}:0.25\text{AgCl}] : (1-x) [\text{Ag}_2\text{O}:\text{B}_2\text{O}_3]$ glass system".
15. 81st Indian Science Congress, Jaipur (India), Jan. 3-8, 1994. Two of my Ph. D. students were nominated for the ISCA-94 Young scientist award for separate contributions. One of my students, Mr. Ranveer Kumar won the 'Young Scientist-94' award for Physics.
16. 1st Nat. Conf. on Solid State Ionics, Amritsar (India), Feb. 14-16, 1994. Paper entitled "[$0.75\text{AgI}:0.25\text{AgCl}$] quenched system: A better choice as host compound in place of AgI to prepare Ag⁺ ion conducting superionic glasses and composites" was presented.

17. 5th Nat. convention of Electromist, Delhi (India), April 6-8, 1994. Paper entitled “Solid State electrochemical battery using Ag⁺ ion conducting superionic solids” was presented.
18. 4th Asian Conf. on Solid State Ionics, Kuala Lumpur (Malaysia), Aug. 2-6, 1994. Following two papers were presented:
 - (i) “Battery and thermoelectric power studies on 0.70[0.75AgI:0.25AgCl]:0.3 Al₂O₃ composite electrolyte”
 - (ii) “Investigation on transport properties of mixed glass system: 0.75[0.75AgI:0.25AgCl]:0.25[Ag₂O: CrO₃]
19. 5th Int. Symp. in Electrochem. Sci. & Tech. Madras (India), Nov. 24-26, 1994. Paper entitled “Solid state electrochemical devices: solid state battery using Ag⁺ ion conducting electrolyte” was presented.
20. 82nd Indian Science Congress, Calcutta (India), Jan.3-8, 1995. Paper entitled “A new fast Ag⁺ ion conducting composite electrolyte system: Solid state battery and thermoelectric power studies”.
21. 6th Ann. Gen. Meet. Res. Soc. India, Kharagpur (India), Feb. 8-10, 1995. Paper entitled “Studies on ionic transport properties of a new Ag⁺ ion conducting composite electrolyte system (1-x) [0.75AgI:0.25AgCl]: xSnO₂”.
22. 10th Int. Conf. on Solid State Ionics, Singapore, Dec. 3-8, 1995. Paper entitled “Estimation of ionic drift velocity on some fast Ag⁺ ion conducting glass and composite systems” was presented.
23. 2nd Nat. Conf. on Solid State Ionics, Madras (India), Feb. 15-17, 1996. Paper entitled “Transport property studies on some new Ag⁺ ion conducting superionic solids” was presented.
24. 5th Asian Conf. on Solid State Ionics, Candy (Sri Lanka), Dec. 2-7, 1996. Following four papers were presented:
 - (i) “Ionic drift velocity and mobility measurements on a quenched [0.75AgI:0.25AgCl] mixed-system or solid solution”.
 - (ii) “Temperature dependence of transference number and ionic drift velocity on some silver halide systems”.
 - (iii) “Transport property studies Ag⁺ ion conducting composite electrolyte system (1-x) AgI: xSnO₂”.
 - (iv) “Thermoelectric power study on a new Ag⁺ ion conducting composite electrolyte system: (1-x)[0.75AgI:0.25AgCl]: xSnO₂”.
25. 3rd Exposition and Symp. For New and Renewable Energy Equipments, Int. Energy Foundation, Tripoli (Libya), Sept. 16-18, 1997. Paper entitled “Solid state ionic electrochemical energy devices- Prospects & limitations: An overview” was accepted as invited lecture.
26. 11th Int. Conf. on Solid State Ionics, Hawaii (USA), Nov. 16-21, 1997. Following two papers were accepted for presentation:
 - (i) “Transport property studies on a new Ag⁺ ion conducting SiO₂-dispersed solid electrolyte system”.
 - (ii) “Investigation on a new silver molybdate glass system: x[0.75AgI:0.25AgCl):(1-x)[Ag₂O:MoO₃]]”
27. 3rd Nat. Conf. on Solid State Ionics, Itanagar (India), March 23-26, 1998. Following four papers were presented:
 - (i) “DC polarization technique: An experimental tool in the study of ion conductors” (Invited Lecture).
 - (ii) “Polarization/ self-depolarization studies on Ag⁺ ion conducting quenched [0.75AgI:0.25AgCl] mixed-system/ solid-solution”.
 - (iii) “Studies on persistent polarization/ memory-type effect in Ag⁺ ion conducting quenched [0.75AgI:0.25AgCl] mixed-system/ solid-solution”.
 - (iv) “Studies on polarization/ self-depolarization on Ag⁺ ion conducting borate glass system: 0.7[0.75AgI:0.25AgCl]:0.3[Ag₂O:B₂O₃]”.
28. Nat. Conf. on Sci. & Tech. of Exotic Materials, Bhopal (India), June 5-6, 1998. Paper entitled “Estimation of mobile ion concentration in Ag⁺ ion conducting AgI by dc polarization/ depolarization studies” was presented.
29. 6th Asian Conf. on Solid State Ionics, Suraj Kund (New Delhi, India). Nov. 29-Dec. 4, 1998. Following three papers were presented:

- (i) "Thermoelectric and power and battery discharge characteristic Studies on a new silver ion conducting composite electrolyte system".
- (ii) "Glass former-compositional dependent conductivity studies on a new Ag^+ ion conducting glass system: x $[\text{0.75AgI:0.25AgCl}]:(1-x)[\text{Ag}_2\text{O:MoO}_3]$ ".
- (iii) "Estimation of mobile ion concentration in some silver ion conducting solid electrolyte systems by dc polarization/ self-depolarization studies".
30. 12th Int. Conf. on Solid State Ionics, Thessaloniki (Greece), Jan. 6-12, 1999. Following two papers were accepted for presentation:
- (i) "Effect of mixed glass former- glass $0.7[\text{0.75AgI:0.25AgCl}]:0.3[\text{Ag}_2\text{O:}\{\text{B}_2\text{O}_3: (1-x)\text{MoO}_3\}]$ ".
- (ii) "Characterization of basic transport parameters on a new Ag^+ ion conducting composite electrolyte system : $(1-x)$ $[\text{0.75AgI:0.25AgCl}]: x \text{ZrO}_2$ ".
31. 4th Nat. Conf. on Solid State Ionics, Bombay (India), March 3-5, 2000. Following two papers were presented:
- (i) "Solid state battery discharge characteristic studies on a new Ag^+ ion conducting glass system: $0.7[\text{0.75AgI:0.25AgCl}]:0.3[\text{Ag}_2\text{O:}\{\text{B}_2\text{O}_3: (1-x)\text{MoO}_3\}]$ ".
- (ii) "Thermoelectric and power and battery discharge characteristic Studies on a new silver ion conducting 2-phase composite electrolyte system: $0.9[\text{0.75AgI:0.25AgCl}]:0.1\text{ZrO}_2$ ".
32. 5th National conference on Solid State Ionics, February 15-17, 2002, Nagpur (India). Following two papers were presented:
- (i) "Studies on a new silver molybdate glass system: $[\text{0.75AgI:0.25AgCl}]:(1-x)[\text{Ag}_2\text{O:MoO}_3]$
- (ii) "Investigation on a new Ag^+ ion conducting two-phase composite electrolyte system: $[\text{0.75AgI:0.25AgCl}]: (1-x) \text{Fe}_2\text{O}_3$ ".
33. 7th International Symposium on Advanced in electrochemical Science and Technology, November 27 – 29, 2002, Madras (INDIA). Following two papers were presented.
- (i) "Investigation on Silver Tungstate Glass: $[\text{0.75AgI:0.25AgCl}]:(1-x)[\text{Ag}_2\text{O: WO}_3]$ - A New Ag^+ Ion conducting Solid Electrolyte System".
- (ii) "Discharge Characteristic Study on Solid State Battery using Composite Solid Electrolyte system: $0.8[\text{0.75AgI:0.25AgCl}]: 0.2\text{Fe}_2\text{O}_3$ ".
34. 8th Asian Conference on Solid State Ionics, December 15-19, 2002, Langkawi (Malasia). Following two papers were presented:
- (i) "Polarization/ Self-depolarization Studies on Some Fast Ag^+ Ion Conducting Glasses".
- (ii) "Solid State Battery Discharge Characteristic Studies on Some New Ag^+ Ion Conducting Glasses".
- Int. Conf. on Ionic Devices, Nov. 28-30, 2003 Madras. Following papers were presented.
- (i) "Electrical properties of a new Ag^+ ion conducting glass system: $x[\text{0.75AgI:0.25AgCl}]: (1-x)[\text{Ag}_2\text{O: P}_2\text{O}_5]$ ".
- (ii) "Transport properties and battery discharge characteristic of Ag^+ ion conducting composite electrolyte system: $(1-x)[\text{0.75AgI:0.25AgCl}]: x\text{Fe}_2\text{O}_3$ ".
36. Int. Conf. Electrochemical Power sources (ICEPS-2), 20-21 Dec 2004, Hyderabad. Following two papers were presented:
- (i) "Solid state Battery Discharge Characteristic studies on a new fast Ag^+ ion Conductivity Glass"
- (ii) "Study of ionic motion in a new Ag^+ ion conducting Quaternary Solid Electrolyte system".
37. 6th National Conf. Solid State Ionics, 5-7 Oct2004, Jadavpur Univ. Kolkata. Following two papers were presented.

- (i) "A novel liquid-solid lead-acid secondary Battery: study of Charge-discharge Behaviour".
- (ii) "Transport property studies on a new Silver ternary glass Electrolyte System: $[0.75\text{AgI}:\text{AgCl}:(1-x)\text{Ag}_2\text{O}:\text{V}_2\text{O}_5]$ ".
38. Int. Conf. Electroactive Polymers: Materials & Devices (ICEP-2004), 1-5 Nov, 2004, Dalhousie: Following paper was presented:
"Study of Ionic- polaret / Electret-type effect in some ion conducting polymer".
39. Nano 2005, Int. Conf. on Nanomaterials, July 13-15, 2005, Sivakasi, T. N., India. Paper entitled "Investigation on Electrical and Electrochemical Properties of Nano Composite Polymer Electrolyte Films" accepted for presentation.
40. 15TH Int. Conference on Solid State Ionics, July 17-22, 2005, Baden-Baden, (Germany). Paper entitled: "A new Ag^+ ion conducting quaternary solid electrolyte system: $x[0.75\text{AgI}:\text{AgCl}]:(1-x)\text{KI}$ - ion transport and battery discharge characteristic studies".
41. 93rd Indian Science Congress, Section of Material Science, Jan. 3-7, 2006, Hyderabad (India). Paper entitled "Nano Composite Polymer Electrolyte Materials: Synthesis, Characterization and All- Solid-State Battery Applications" has been presented as Invited Talk.
42. 3rd M.P. Science Congress, 9-10 Dec. 2006, Rajeev Gandhi College, Bhopal. Following paper was presented as invited talk:
"Solid State Ionics: Materials and Electrochemical Device Applications".
3rd International Conference on Ionic Devices (3rd ICID-06), to be held at Anna University, Chennai, 7-9 Dec. 2006. Following papers were presented:
43. "Discharge characteristic study on solid state battery based on hot-press-synthesized Ag^+ ion conducting nano composite polymeric electrolyte film: 95 (90 PEO: 10 AgNO_3) : 5 SiO_2 "
"Electrochemical Cell Performance Studies on All-Solid State Battery using Nano-composite polymer Electrolyte Membrane"
94th Indian Science Congress, Section of Material Science, Jan. 3-7, 2007, Annamalai Nager (India). Paper entitled:
"Ion Transport Property Studies on Ag^+ Ion Conducting Quaternary Solid Electrolyte Systems: $x [0.75\text{AgI}:\text{AgCl}]:(1-x)\text{RbI}$ ". (Best Poster Paper Presentation Award)
44. National Conference on Physics of Nanostructures & Biomolecules, 22-24 Jan. 2007, M.S. University, Baroda, Gujrat. Paper entitled: "Characterization of ion transport properties on hot-press synthesized Ag^+ ion conducting nano-composite polymer electrolyte membranes: $(1-x) [90\text{ PEO}:\text{AgNO}_3]:x\text{SiO}_2$ "
46. Second Int. Conf. Electroactive Polymers: Materials & Devices (ICEP-2007), 19-24 Feb., 2007, Goa. Following two papers were presented:
(i) "Synthesis and ion transport studies on a hot-pressed Ag^+ ion conducting solid polymer electrolytes: $(1-x)\text{PEO}:x [0.7(0.75\text{AgI}:\text{AgCl}):0.3\text{RbI}]$ ".
(ii) "Investigations on ion conducting behaviour synthesized by a novel hot-press technique".
47. National Conference on Physics of Nano Structured Functional Materials, 16-17 March 2007, Bhilai Institute of Technology, Durg, Chhattisgarh. Following paper was presented:
"Cell potential discharge characteristic studies on thin film solid state battery based on hot-press-synthesized Ag^+ ion conducting solid polymer electrolytes: 70 PEO: 30 $[0.7(0.75\text{AgI}:\text{AgCl}) : 0.3\text{MI}]$ ($\text{M} \equiv \text{Rb}, \text{K}$)".
48. 3rd National Conference on Advances in Electronic Materials & Devices (AEMD- 07), 25-26 March 2007, Guru Ghasidas University, Bilaspur, Chhattisgarh. Following paper was presented as invited talk:
"Solid state batteries: Electrochemical power sources for microprocessors to massive transport sectors.

49. National Conference on Horizons of Electrolytic, Electronic & photonic Materials Physics, Shri Shankracharya College of Engg. & Technology, Bhilai, Chhattisgarh, 26-27 October 2007. Following paper was presented as invited talk:
“Solid State Ionics: Materials and Electrochemical Device Applications”
50. 7th National Conf. on Solid State Ionics (7th NCSSI), APS University, Rewa, 1-3 Nov. 2007. Following paper was presented as invited talk:
“Solid State Batteries: Present Trends”
51. 52nd DAE Solid State Physics Symposium 2007, 27-31 Dec. 2007, University of Mysore. Following paper was presented:
“Cell-potential discharge performance studies on solid state batteries based on newly synthesized fast Ag⁺ ion conducting vanadate/ phosphate glass electrolytes”.
52. 95th Indian Science Congress, Section of Material Science, Jan. 3-7, 2008, Andhra University Vishakhapatnam (India). Following paper was presented as invited talk:
“Conventional to Modern Batteries Based on Electrochemical Energy Materials: An Overview”
53. 10th International Conf. on Interdisciplinary Approaches in Physical Sciences: Growing Trends and Recent Advances, Bilaspur, 12-14 Jan. 2008. Following paper was presented:
“Ion transport property studies on hot-press synthesized Na⁺ ion conducting nano-composite polymer electrolyte films: (1-x) [75 PEO: 25 NaNO₃]: x SiO₂”
54. National Conference on the Application of Materials Science in the Service of the Society, Allahabad, 5-6 Feb. 2008. Following paper was presented as invited talk:
“Solid State Batteries Based on Solid Electrolyte Materials”
55. 11th Asian Conference on Solid State Ionics, Coimbatore, India, 9-13th June 2008. Following papers were presented:
- (i) “Study of Ion Transport Phenomenon in a new Mg⁺⁺ ion conducting solid polymer electrolyte: PEO: Mg (ClO₄)₂ – Synthesized by a Novel Hot-press Method”
 - (ii) “Electrical Property Studies on a Novel Hot-press-synthesized Na-Ion Conducting Polymeric Membranes: (1-x) PEO: x NaNO₃”
 - (iii) “A Novel Hot-press/ dry Casted Solid Polymer Electrolyte (SPE) Films: (1-x) PEO: x KOH; Characterization of Ion Transport Behaviour”
 - (iv) “Investigations on Hot-press-synthesized Nano Composite Polymer Electrolyte (NCPE) Membranes: (1-x) [70PEO:30KIO₃]: x SiO₂”
56. 8th National Conference on Solid State Ionics (8th NCSSI), Dr. H. S. Gaur University, Sagar during Dec. 7-9, 2009. Following papers have been presented.
- (I) “Investigations on Ion Transport Behavior in Hot-pressed Nano Composite Polymer Electrolyte (NCPE) Membranes: [80 PEO: 20 Mg (CF₃SO₃)₂] + x SiO₂,”
 - (II) “Characterization of Materials and Structural Properties on Hot-Press Synthesized Solid Polymer Electrolyte (SPE): (75PEO: 25NaNO₃) and Nano-Composite Polymer Electrolyte (NCPE): (75PEO: 25 NaNO₃) + SiO₂ Membranes”.
57. “Conductivity Enhancement in Nano - Composite Polymer Electrolytes (NCPEs): A Consequence of Fractional Dispersal of Non-Conducting Nano Filler Materials” (was presented) at Int. Conf. on Nano Science & Technology (ICONSAT) at IIT Powai (Mumbai) during Feb. 17-20, 2010.
58. “Ion transport and electrochemical property studies on hot-press synthesized solid polymer electrolyte film: PEO: NaNO₃ presented in ISPE-12, Padova, Italy during Aug. 29 – Sept. 3rd, 2010.

59. "Ion transport property and all-solid-state battery studies on hot-press casted nano-composite polymer electrolyte membrane: [92PEO: 8NaI] + 5SiO₂", R. C. Agrawal, Y. K. Mahipal, Dinesh Sahu, Rehana Ashrafi, presented in 4th International Conference on Electroactive Polymers: Materials & Devices was hold in Surajkund, New Delhi During Nov. 21-26, 2010.
60. "Conductivity enhancement in TiO₂ dispersed nano-composite polymer electrolyte films: 80PEO: 20 MgTf + xTiO₂ and study of all-solid-state cell performances" R. C. Agrawal, D. K. Sahu, Y. K. Mahipal, Rehana Ashrafi, presented in 4th International Conference on Electroactive Polymers: Materials & Devices was hold in Surajkund, New Delhi During Nov. 21-26, 2010.
61. Following two papers have been accepted for the favour of presentation in the forthcoming International Conference on Solid State Ionics (SSI-18) will be held at Warsaw, Poland during July 3-8, 2011.
- (i) "Hot-Press Casted Solid Polymer Electrolyte (SPE) Films: (PEO: xKNO₃); Characterization of Materials, Ion Transport Properties and Study of All-Solid-State Cell Performance" R. C. Agrawal*, Y. K. Mahipal, Dinesh Sahu, Rehana Ashrafi
- (ii) "Ion Transport and All-Solid-State Battery Performance Studies on Hot-Press Casted Mg²⁺ - Ion Conducting Nano-Composite Polymer Electrolyte (NCPE) Membranes" R. C. Agrawal*, Dinesh Sahu, Y. K. Mahipal, Rehana Ashrafi
62. Following one papers have been accepted for the favour of presentation in the forthcoming Asian Conference on Solid State Ionic to be held at Sendai, Japan during July 17-20, 2012.
- (i) "Ion Transport and All-Solid-State Battery Characterization Studies on Mg²⁺-ion Conducting Nano-Composite Polymer Electrolyte (NCPEs): (75PEO: 25MgSO₄) + x MgO", R. C. Agrawal*, Y. K. Mahipal, Dinesh Sahu, Priyanka Keshrawani
- (ii) "Electrical and Electrochemical Properties of New Mg²⁺ - ion Conducting Polymer Electrolyte Membranes", R. C. Agrawal*, Dinesh Sahu, Y. K. Mahipal, Rehana Ashrafi.
63. Following two paper have been presented in the fifth International Conference on Electroactive Polymers: Materials & Devices (ICPE 2012) B.H.U., Varanasi (india) during November 4-9, 2012.
- (i) Electrical & Electrochemical Property Studies on hot-press Casted silver Ion Conducting Solid Polymer Electrolyte (SPE) Membranes: [(1-x) PEO: x Ag (CF₃SO₃)] , R. C. Agrawal*, Rehana Ashrafi, Dinesh K. Sahu, Y. K. Mahipal
- (ii) Ion Transport Property and All-Solid_State Battery Performance Studies on Mg²⁺ - ion Conducting Nano-Composite polymer Electrolytes (NCPE) Films., R. C. Agrawal*, Dinesh K. Sahu^a, Y. K. Mahipal¹, Rehana Ashrafi¹
64. Following two paper have been presented in the International Conference on Materials for Advanced Technologies (ICMAT), 30 June to 5 July, 2013 in Singapore.
- (i) "Conductivity Enhancement in Mechano-Chemically Synthesised Solid Polymer Electrolyte (SPE) : [PEO: C₂H₃CuO₂] Membranes-A Consequence of Nano Ionics Effects", Rehana Ashrafi, Dinesh K. Sahu, Manju Ganjir , R. C. Agrawal*.
- (ii) "Investigation on Fumed Silica Dispersed Mg²⁺-ion Conducting Nano Composite Polymer Electrolytes (NCPEs): [80PEO: 20Mg(CF₃SO₃)₂] + xSiO₂" R. C. Agrawal*, Dinesh K. Sahu, Rehana Ashrafi.
65. Following two paper have been presented in the International Conference on Solid State Ionics (ICSSI) Tokyo Japan, During 2-7, June.
- (i) "Ag⁺ - Ion Conducting Nano-Composite Polymer Electrolytes (NCPEs): Synthesis, Characterization and All-Solid-Battery Studies". Rehana Ashrafi, Dinesh K. Sahu, R. C. Agrawal*.

- (ii) "Active Filler Dispersed Mg^{2+} -Ion Conducting Nano Composite Polymer Electrolyte (NCPE) : Materials and Ion Transport Property Studies" Dinesh K. Sahu, Rehana Ashrafi, Y. K. Mahipal, R.C. Agrawal*.
66. Following two paper have been presented in the 10th NCSSI, IIT Kharagpur (W.B.).
- (i) "Effect of Active Nano-Filler Particle Dispersal on Ionic Conductivity of Solid Polymer Electrolyte (SPE): [PEO: $Mg(NO_3)_2$]" R. C. Agrawal, Manju Ganjir, Dinesh K. Sahu, P. Kesharwani, Y.K. Mahipal, R. Ashrafi.
- (ii) Mg^{2+} -ion conducting Dry Polymer Electrolytes: Effect of polymer blending and dispersal of active filler on conductivity" R. C. Agrawal, Priyanka Kesharwani, Dinesh K. Sahu, Manju Ganjir, Y. K. Mahipal.
67. Advances in Functional Materials ,International Conference, 2015. Stony Brook, New York, USA. Following paper was presented: "Investigation on Ion Transport Behaviour in a Non-Lithium Chemical based Solid Polymer Electrolyte (SPE): [PEO:ZnA]" R. C. Agrawal*, Shrabani Karan, Tripti Bala Sahu, Manju Sahu.

PAPER PRESENTED AT NATIONAL/ INTERNATIONAL CONFERENCES AS INVITED TALK

1. 93rd Indian Science Congress, Section of Material Science, Jan. 3-7, 2006, Hyderabad (India).
2. 3rd M.P. Science Congress, 9-10 Dec. 2006, Rajeev Gandhi College, Bhopal.
3. 3rd National Conference on Advances in Electronic Materials & Devices (AEMD- 07), 25-26 March 2007, Guru Ghasidas University, Bilaspur, Chhattisgarh.
4. National Conference on Horizons of Electrolytic, Electronic & photonic Materials Physics, Shri Shankracharya College of Engg. & Technology, Bhilai, Chhattisgarh, 26-27 October 2007.
5. 7th National Conf. on Solid State Ionics (7th NCSSI), APS University, Rewa, 1-3 Nov. 2007.
6. 95th Indian Science Congress, Section of Material Science, Jan. 3-7, 2008, Andhra University Vishakhapatnam (India).
7. National Conference on the Application of Materials Science in the Service of the Society, 5-6 Feb. 2008, C.M.P. Degree College, Allahabad.
8. 11th Asian Conference on Solid State Ionics, Coimbatore, India, 9-13th June 2008.
9. National conference on recent trends of advanced nano technology, Jan. 12-13, 2009, SSCET, Bhilai.
10. National Conference on Solid State Ionics, Dec. 7-9, 2009, Dr. H. S. Gaur University, Sagar, MP.
11. National Conference on Material Science, Govt. Arts & Science College, Arvi, Wardha, MS.
12. National Conference on Solid State Ionics (NCSSI-9), Dec. 15-17, 2011, JIIT, NOIDA.
13. Invited to deliver a talk in 13th Asian Conference on Solid State Ionics (ACSSI-2012), July 17-20, 2012, Sendai, Japan.
14. Invited to deliver a talk Nano Science Center, University of Cambridge, UK, May 18, 2012
15. Invited to deliver a talk 10th Zurich Soft Matter Days, Nov. 13-16, 2012, Germany.
16. Invited to deliver a talk at TechConnect World' , May 12-16, 2013, Washington, DC, U.S.A.
17. Invited to deliver a talk at Shri Shankaracharya College of Engg. &Tech. Bhilai, India.
18. Invited to deliver a talk at Allahabad university, 24-26 Octber 2013, Allahabad, India.