Brief Biodata

Name: Dr. Ashok Kumar

Designation:	Principal Scientist
D.P. No. and Name:	D.P. No. 1.06, Pressure Vacuum and Ultrasonic Metrology Section
D.U. No. and Name:	D.U. No.1, Physico-Mechanical Metrology
Email:	ashok553@nplindia.org
Date of Joining CSIR-NPL:	02-04-2012
Phone *(office)*	011-4560-8533

Research Area/ Interest

The area of specialization is the fabrication and characterization of Ultra-high vacuum and pressure equipment and devices, Nanostructured Ferroelectrics, Nanoelectronics, Raman Spectroscopy, Superlattices, Spintronics, Relaxors, Multiferroics, High-k dielectrics, High energy density capacitors, Development of the non-volatile random access memory elements and devices, Magnetic field sensors, High power delivery system, Photovoltaic devices for the green energy, Piezoelectric sensors, and optically active ferroelectric relaxors and Blood pressure related sensors and devices.

Educational Qualifications

(Please write latest qualification first)

Degree	**Subject**	**University/ Institute**	**Year**
Bachelor of Science	Physics	T. M. Bhagalpur University	1992
Master of Science	Physics	T. M. Bhagalpur University	1999
Ph.D.	Physics	T. M. Bhagalpur University	2005

Academic / Research Experience

Grade / Post	**Institute**	**Duration**		**Research Field**
		From	**To**	
Research Assistant	I.I.T Kharagpur	Jan 2005	May 2006	Solid Oxide Fuel Cell
Postdoctoral fellow/Research Faculty	University of Puerto Rico, U.S.A.	June 2006	Oct 2011	Multiferroics and Ferroelectrics
Assistant Professor	Central University G.G.U., Chhattisgarh	Nov 2011	Dec 2011	Multiferroics and Ferroelectrics

Visiting Scientist	University of Puerto Rico, U.S.A.	Jan 2012	March 2012	Multiferroics and Ferroelectrics
Senior Scientist	CSIR-NPL	April 2012	March 2016	Pressure and Vacuum; Nanoelectronics, Pressure Sensors, Blood Pressure, High energy density capacitor, Resistive switching, Multiferroics and Ferroelectrics
Principal Scientist	CSIR-NPL	April 2016	Continue...	Pressure and Vacuum; Nanoelectronics, Pressure Sensors, Blood Pressure, High energy density capacitor, Resistive switching, Multiferroics and Ferroelectrics

No of Publications

No. of Publications in S.C.I. Journals	**No. of Publications in non-SCI Journals**	**No. of Publications in Conference Proceedings**	**Books (chapter)**	**Total**
> 300	**-**	**-**	**12**	

Selected Publications

1. Recent progress in the fabrication and applications of flexible capacitive and resistive pressure sensors, Bijender, **Ashok Kumar**, *Sensors and Actuators: A. Physical*, 344, 113770 (2022).
2. Resistive switching in emerging materials and their characteristics for neuromorphic computing, Md Asif, **Ashok Kumar**, *Materials Today Electronics*, 1, 100004 (2022).
3. Evaluation of effective area of air piston gauge with limitations in piston-cylinder dimension measurements, Vikas N Thakur, Felix Sharipov, Yuanchao Yang, Sandeep Kumar, Jokhan Ram, Omprakash, Harish Kumar, Rina Sharma, Sanjay Yadav, **Ashok Kumar**, *Metrologia*, 58 035004 (2021)
4. Flexible microhyperboloids facets giant sensitive ultra-low pressure sensor, S Kumar, Bijender, S Yadav, **Ashok Kumar**, *Sensors and Actuators: A. Physical* 328, 112767 (2021)
5. Low-Pressure Mechanical Switching of Ferroelectric Domains in PbZr0.48Ti0.52O3, G Vats, Ravikant, P Schönherr, **Ashok Kumar**, J Seidel, *Advanced Electronic Materials*, 6, 2000523, (2020)
6. Giant pressure sensitivity in piezo/ferro-electric ceramics, Vikas N. Thakur, Bhanu P.

Singh, Sanjay Yadav, and **Ashok Kumar**, *R.S.C. Advances*, 10, 9140 (2020)

7. Tin titanate—the hunt for a new ferroelectric Perovskite, J Gardner, Atul Thakre, **Ashok Kumar** and J F Scott, *Rep. Prog. Phys.* 82, 092501(2019)
8. Highly-sensitive potassium-tantalum-niobium oxide humidity sensor, Ravikant, S Singh, G Gupta, S Yadav, PK Dubey, VN Ojha, **Ashok Kumar**, *Sensors & Actuators: A. Physical*, 295, 133, (2019).
9. Structural transformations and physical properties of (1-x) Na0.5Bi0.5TiO3-x BaTiO3 solid solutions near morphotropic phase boundary, H. S. Mohanty, T. Dam, Hitesh Borkar, Dhiren K Pradhan, K K Mishra, **Ashok Kumar**, Balaram Sahoo, Pawan K Kulriya, C Cazorla, J F Scott and Dillip K Pradhan, *J. Phys.: Condens. Matter* 31 075401 (2019)
10. Experimental Evidence of Electronic Polarization in a Family of Photo-ferroelectrics, H Borkar, V Rao, M Tomar, V Gupta, JF Scott, **Ashok Kumar**, *R.S.C. Advances* 7, 1284(2017)
11. Experimental verification of the ab initio phase transition sequence in $SrZrO_3$ and comparisons with SrHfO3 and SrSnO3, Ashok Kumar, S Kumari, H Borkar, RS Katiyar, JF Scott, npj Computational Materials, 2 (2017)
12. Giant pyroelectric energy harvesting and a negative electrocaloric effect in multilayered nanostructures, G Vats, **Ashok Kumar**, N Ortega, CR Bowen, R. S Katiyar, *Energy Environ. Sci.* 9, 1335-1345 (2016)
13. The Nature of Magnetoelectric Coupling in Pb(Zr,Ti)O3 –Pb(Fe,Ta)O3, Donald M. Evans, Marin Alexe, Alina Schilling, **Ashok Kumar**, Dilsom Sanchez, Nora Ortega, Ram S. Katiyar, James F. Scott, and James Marty Gregg, *Advanced Materials*, DOI: 10.1002/adma.201501749, (2015).
14. Room Temperature Lead-Free Relaxor-Antiferroelectric Electroceramics for Energy Storage Applications, H Borkar, VN Singh, M Tomar, V Gupta, BP Singh, **Ashok Kumar**, *R.S.C. Advances*, 4, 22840, (2014).
15. Magnetic switching of ferroelectric domains at room temperature in multiferroic PZTFT. D.M. Evans, A. Schilling, **Ashok Kumar**, D. Sanchez, N. Ortega, M. Arredondo, R.S. Katiyar, J.M. Gregg and J.F. Scott. *Nature Communications* |4:1534 | DOI: 10.1038/ncomms2548, (2013) *the above article is highlighted by Nature India*
16. New Recipe of memory devices, *Nature India*, Research highlight, **Ashok kumar** DOI: 10.1038/nindia.2012.64; (2012).
17. Magnon Raman spectroscopy and in-plane dielectric response in BiFeO3:Relation to the Polomska transition, **Ashok Kumar**, R. S. Katiyar, J F Scott, *Phys. Rev. B*, 85, 224410 (2012).
18. Magnetic control of large room-temperature polarization, **Ashok Kumar**, G. L. Sharma, R.S. Katiyar, J. F. Scott, R. Pirc, R. Blinc, *J. Phys. Condens. Matter* 21, 382204 (2009)(Top 25 papers of 2009, JPCM).
19. Relaxed Coupling, **Ashok Kumar** et al. "*Nature Materials" Research highlight*, 8, 772, (2009).
20. Impedance spectroscopic studies of the multiferroics Pb(Zr,Ti)O3-CoFe2O4 layered thin films, N. Ortega, **Ashok Kumar**, P. Bhattacharya, S.B. Majumder and R.S. Katiyar, *Physical Review B* 77, 014111 (2008).

Patents

- Room-temperature magnetoelectric multiferroic thin films and applications thereof, **U.S. patent: Application No #:** Patent N0.: US 8,803,264 B1**, Date: 8/2014. Inventors:** Ram S Katiyar, **Ashok Kumar**, James F Scott
- Micro and Nanoscale Magnetoelectric Multiferroic Lead Iron Tantalate-Lead Zirconate Titanate. **US patent: Application No #: UPR-10150, Filing Date: December 2012.** UPR-12203 (approved, 2016): Inventors: Ram S Katiyar, Dilsom Sanchez, **Ashok**

Kumar, Nora Ortega, James F Scott, Marty Gregg, D Evans

- **Multi-States Nonvolatile Opto-Ferroelectric Memory, Indian patent: Application No #: 201611001338,** U.S. 2017/0206952 A1, US10115456B2 (granted 2018). Inventors: **Ashok Kumar,** Hitesh Borkar, Vaibhav Rao, Monika Tomar, Vinay Gupta
- **Low cost and high sensitivity polar resistive humidity sensor, Indian patent ref. No:** Indian patent No: 201711040726, dated 15/11/2017, Published on 17.05.2019 (B81C1/00) **Inventors: Dr. Ashok Kumar, Mr. Ravikant, Mr. Sheshamani Singh, Mr. Hitesh Borkar, Mr. Gaurav Gupta, Mr. Shashank Singh, Dr. P K Dubey, Dr. Sanjay Yadav, Dr. V N Ojha**
- **An automatic calibration setup for multiple blood pressure measuring instruments,** , **Inventors:** Dr. Sanjay Yadav, Rahul Kumar, Dr. Ashok Kumar, Dr. P K Dubey, Om Prakash, Nita D Sharma, Afaqul Zafer, Harish Kumar, V K Gupta, S K Jaiswal, Ashutosh Agarwal **(submitted 2021)**

Current Activities

(Not more than 100 words)

Development and maintenance of five Primary Pressure and Vacuum Standards. We are also working to establish the optical interferometer manometer, a quantum pressure standard. Design and Development of Blood pressure sensors and devices to monitor human physiological activities. Nanostructured Ferroelectrics, Nanoelectronics, Superlattices, Spintronics, Resistive switching, Relaxors, Multiferroics, High-k dielectrics, High energy density capacitors, non-volatile random access memory elements and devices, magnetic field sensors, piezoelectric sensors, pressure sensors, etc.

Honour(s)/Award(s)/ Fellowship(s)

Fellow of Metrology Society of India, CSIR Research Associateship (2005/2006)

Contributions to AcSIR

Teaching and curriculum preparation of Precision Measurements and Quality Control (PMQC) coursework and Materials Metrology coursework. Four (4) students were awarded a Ph.D. degree, and Six (6) students have been pursuing Ph.D. in various fields of Materials and Metrology. Six students were awarded for M.Tech. Degree and Manshi Sharma is working as a project assistant for optical metrology.

Membership in Professional Societies/ Institutions

Fellow of the metrology society of India (MSI).

Any other Information

(Not more than 100 words)

I am also serving on various editor and editorial boards, such as Science Jet (Associate Editor), Current Nanoscience (Editorial Member), Nanoscience and Nanometrology (Editorial Member), Frontiers in Materials, section Quantum Materials (Associate Editor) and regularly reviewing manuscripts from various journals.