

Bio-Data of Prof. Pawan Kumar

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Father's Name: Sh. Bhup Singh
Mother's Name: Smt. Krishna Devi



Prof. Pawan Kumar

EDUCATION

(1) Ph. D, Department of Physics, **Indian Institute of Technology Delhi**, Year of Passing Ph. D Degree- 2004, **TITLE OF THE THESIS "Preparation and Characterization of PMN-PT Bulk and Thin Ferroelectric Films"**

(2) Master of Science in Physics, 2000, **MDU, Rohtak (Haryana)**
Achievement:- **Obtained JRF+NET of CSIR-UGC in June-2000 and Dec. 2000**

(3) Bachelor of Science, 1998, **Hindu College, Sonipat, MDU, Rohtak (Haryana)**, Subjects:- Physics, Comp. Sci. & Mathematics
Achievement:- **Received University Scholarship.**

(4) Intermediate (12th), 1995, **Hindu Sr. Sec. School, Sonipat, BSEH, Haryana**
Achievement- **Received State Fellowship & Distinction in Phy.**

(5) Secondary (10th), 1993, **BSEH, Haryana**
Achievement: **Received State Fellowship**

Professional/Teaching/Research Employment & Experience

✓ **Research Experience: ~22 Years (total) & ~18 Years (excluding Ph.D)**

✓ **Teaching Experience: ~18 Years (both UG and PG)**

Career Progression at NIT Rourkela:

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|---------------------------------------|--------------|-----------------|
| Professor (14A) | NIT Rourkela | Feb 2020 |
| Associate Professor (9500AGP) | NIT Rourkela | Jan 2014 |
| Associate Professor (9000 AGP) | NIT Rourkela | Jul 2011 |
| Assistant Professor (9000 AGP) | NIT Rourkela | Jul 2008 |
| Assistant Professor (7000AGP) | NIT Rourkela | Jul 2006 |

Organization of Short Term Courses, Workshop & Conferences:

- **CM (Condensed Matter)-Days:** National Conference: 29th August-31st Aug. 2007 at NIT Rourkela: Co-Convener
- **“Indo-US Workshop on Functional Materials Processing & Characterizations”** Jan. 3-6, 2012 at NIT Rourkela: Convener
- Online Workshop on **“INTELLECTUAL PROPERTY RIGHTS AND PATENTING PROCEDURE (IPRPP 2021)”** on 17th March 2021: ORGANISER

Administrative Experience:

- i. July 2007-June 2010: **Chairman**, Department Purchase Committee
- ii. July 2010-June 2012: **Chairman**, Depart Academic Committee
- iii. April 2010 – June 2015: **PIC Institute Guest House**
- iv. Selection Committee Expert at **BPSC in May 2016 & July 2017**
- v. July 2016- June 2018: **HOD, Dept. of Physics & Astronomy, NIT Rourkela**
- vi. July 2020- June 2021: **PIC IPR at NIT Rourkela**
- vii. **Faculty Selection Committee Member at IIITD&M in Dec. 2020**
- viii. **Faculty Selection Committee Member at CGU-Bhubaneswar in 2021**
- ix. July 2021- Present, **Head of Unit, Institute Counselling Services**

Courses Designed:

- (i) Physics of Material Synthesis & Characterization 3 Credits (3- 0-0)
- (ii) Physics & Applications of Dielectric Materials 3 Credits (3-0-0)

Research Interest:

- ✓ Synthesis and Characterizations of Bulk, Thin and Nano Functional Materials and Composite Systems by Various Synthesis Techniques like: Solid State Reaction Route, Chemical Route, Combustion Technique, Microwave Processing Techniques etc.
- ✓ Synthesis and Characterizations of perovskite solar cell materials and ceramic-biomaterial composites.

List of Ph.D/M.Tech (R) Students

| | | | | |
|----|-----------------|-------------------|---|-----------------------|
| 1) | M. Pattanaik | Supervisor | Synthesis and Characterizations of Lead Free KNN Ceramics near Morphotropic Phase Boundries | Thesis Awarded (2011) |
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List of Ph.D Students

| S. No. | Name | Supervisor/Co-Supervisor | Thesis Title | Status |
|--------|-----------------|--------------------------|---|-----------------------|
| 1) | P. Palei | Supervisor | Structural and Electrical Properties of Conventional and Microwave Processed Lead Free KNN Based Ceramics | Thesis Awarded (2012) |
| 2) | S. Naresh Kumar | Supervisor | Synthesis & Characterization of $Sr_{0.53}Ba_{0.47}Nb_2O_6$ based Ferroelectric Composites for Pyroelectric Applications | Thesis Awarded (2013) |
| 3) | P. Mishra | Supervisor | Lead Free Ceramic-Polymer Composites for Embedded Capacitor and Piezoelectric Applications | Thesis Awarded (2014) |
| 4) | S.K. Kar | Supervisor | Structural and Electrical Studies of $Ba(FeNb)_{0.5}O_3$ based High Dielectric Constant Materials Synthesized by Conventional and Microwave Processing Techniques | Thesis Awarded (2015) |
| 5) | S. Swain | Supervisor | Synthesis and Characterizations of $SrBi_2Ta_2O_9$ Modified NBT-BT and NBT-KNN Ferroelectric Ceramics near MPB | Thesis Awarded (2016) |
| 6) | Rakesh Muduli | Co-Supervisor | Dielectric, ferroelectric and impedance spectroscopic study of $AgNbO_3$ and its modified systems | Thesis Awarded (2016) |
| 7) | C. Reddy | Supervisor | Synthesis and Characterization of ST and NN modified BNT-KNN, BNT-BT-BKT Ceramics for Energy Storage Applications | Thesis Awarded (2018) |
| 8) | D. Nanda | Supervisor | Synthesis and Characterizations of Magnetolectric Materials Processed by Microwave Assisted Solid State Reaction Route for | Thesis Awarded (2021) |

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| | | | Multifunctional Device Applications | |
| 9) | B. Samanta | Supervisor | Dielectric Properties of Microwave processed $\text{CaCu}_3\text{Ti}_4\text{O}_{12}$ - based Ceramics & related (0-3) Epoxy- Composites | Thesis Awarded (2021) |
| 10) | A. Mahapatra | Supervisor | Synthesis and Characterizations of Organometallic Lead Halide Perovskite Single Crystals for Photovoltaic Applications | Thesis Awarded (2022) |
| 11) | R. Rekha Negi | Supervisor | Synthesis and characterizations of ferroelectric, non-ferroelectric high dielectric constant ceramics modified BT systems for multifunctional applications | Thesis Awarded (2022) |
| 12) | R. Rekha Sahu | Supervisor | Microwave Processed NBT and SBT based Ferroelectric Composites for Multifunctional Device Applications | Thesis Awarded (2022) |
| 13) | Sujata Swain | Supervisor | Hydroxyapatite/Lead-free Ferroelectric Composites Synthesized by Mechanochemically Assisted Solid State Reaction Route for Orthopedic Applications | Thesis Awarded (2022) |
| 14) | A P Kajal Parida | Supervisor | Synthesis and Characterizations of PVDF based Composites for Advanced Biomedical Applications | Completed registration |
| 15) | Somnath Mahapatra | Supervisor | Rarer Earth Perovskite Materials and Pyroelectric Materials for Solar Energy Harvesting. | Completed course work |
| 16) | Biman Kar | Supervisor | Thin films and Nano Electromagnetic composites for multifunctional applications | Completed registration |
| 17) | Anurag | Co-Supervisor | Fabrication of Ultrathin $\text{MoTe}_2/\text{MoS}_2$ Heterostructure based Infrared Detector by Chemical Vapour Deposition Technique | Completed registration |
| 18) | Susmita Garnayak | Supervisor | Biopolymer-ceramic composites for sensors, electromagnetic shielding, environment sensing and medical applications | Course work going on |
| 19) | Nibedan Nanda | Supervisor | Synthesis and characterization of effective perovskite organic/inorganic systems for various device applications. | Course work going on |

Courses Taught

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| Condensed Matter Physics | Classical Mechanics | Physics & Applications of Dielectric Materials | Physics of Material Synthesis & Characterizations |
| PHYSICS – I | PHYSICS – II | Electrodynamics I | Electrodynamics II |
| Properties of Matter | Physics of Semiconductor Materials | Introduction to Condensed Matter Physics | Introduction to Classical Mechanics |
| Electrostatics and Magneto-statics | | | |

List of Sponsored Projects

| Starting Year | PI/Co-PI | Sponsoring Organization | Title of Project |
|----------------------|-----------------|--|---|
| 2007 | PI | DRDO | <i>Synthesis and Characterization of Effective Lead Free Piezoelectric Ferroelectric Ceramics</i> |
| 2008 | Co-PI | DRDO | <i>Modified Barium Titanate/Lead Titanate Ceramics by Semi- Chemical Route</i> |
| 2009 | PI | <i>(CP-STIO Penn State, USA & DST)</i> | <i>Synthesis and characterization of lead free functional materials by microwave processing technique</i> |
| 2009 | Co-PI | <i>ME of Forest, GOI, New Delhi</i> | <i>Development of new Environment friendly Adsorption Media and its value added for application removal of hazardous anions from water</i> |
| 2010 | PI | DST | <i>Composite Ferroelectric Thin Films for Pyro Sensors Applications</i> |
| 2011 | Co-PI | DRDO | <i>Fabrication and Characterization of TiO₂ Nano-rod based Dye-Sensitized Solar Cells (DSSC)</i> |
| 2013 | Co-PI | DST | <i>Simultaneous growth of semiconductor nanowires and nanoparticles for microelectronic and sensor app</i> |
| 2015 | PI | DRDO | <i>Nanometal-Ceramic-Polymer Composites for High Energy Density and Embedded Capacitors Applications</i> |
| 2017 | Mentor | DST | <i>Microwave assisted mechano-chemical processing of (i) Functionally graded bio-ceramics for medical and (ii) Lead free piezoelectric ceramics for multifunctional applications</i> |
| 2018 | PI | IUAC, Delhi | <i>Effect of Swift heavy ion irradiation on dielectric, ferroelectric and leakage current properties of SBT based bulk and thin films.</i> |
| 2019 | Co-PI | DRDO | <i>Fabrication of ultrathin MoTe₂/MoS₂ heterostructure based infrared detector by chemical vapor deposition technique.</i> |
| 2022 | PI | UGC-DAE CSR. | <i>Investigation of phase transition and magnetoelectric coupling in lead-free Ba_(1-x)Ca_xTi_(1-x)Sn_xO₃-NZFO particulate and thin film composites.</i> |

Facilities Created in Functional Material Lab. at NIT Rourkela:

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| Hydraulic Press | LCR Meter | Bulk and Thin Film P-E loop tracer | Resistivity Measurement Set Up |
| Microwave Furnace | High temperature Furnace | Tubular Furnace | Corona poling unit |
| High Energy Ball Milling Machine | Digital weighing balance | Strain vs. electric field (S-E) unit | 4 Target RF Sputtering Unit |
| Spin Coating Unit | | | |

Publications in Journals

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|----|--|
| 1 | P. Kumar, S. Sharma, O. P. Thakur, C. Prakash and T. C. Goel. "Dielectric, Piezoelectric and Pyroelectric Properties of PMN-PT (68:32) System". <i>Ceramics International</i> . vol.30, no.4, pp.585-589, Dec 2004. 10.1016/j.ceramint.2003.07.003 |
| 2 | P. Kumar, S. Singh, O. P. Thakur, C. Prakash and T. C. Goel. "Study of Lead Magnesium Niobate–Lead Titanate Ceramics for Piezo-Actuator Applications". <i>Japanese Journal of Applied Physics</i> . vol.43, no.A, pp.1501-1506, Apr 2004. 10.1143/JJAP.43.1501 |
| 3 | T.C. GOEL, PAWAN KUMAR, A.R. JAMES & CHANDRA PRAKASH. "Processing and Dielectric Properties of Sol-Gel Derived PMN-PT (68:32) Thin Films". <i>J Electroceram</i> . vol.13, pp.503–507, Jul 2004. 10.1007/s10832-004-5148-1 |
| 4 | P. Kumar, S. Sharma, O. P. Thakur, C. Prakash and T. C. Goel. "Ferroelectric properties of bulk and thin films of PMNT system". <i>Physica B: Condensed Matter</i> . vol.357, no.3-4, pp.241–247, Mar 2005. 10.1016/j.physb.2004.07.023 |
| 5 | P. Kumar, S. Sharma, S. Singh, O. P. Thakur, C. Prakash and T. C. Goel. "Structural and Electrostrictive properties in PMN-PT (68:32) ceramics", 326:55–60, 2005". <i>Ferroelectrics</i> . vol.326, no.1, pp.55-60, Apr 2005. 10.1080/00150190500318263 |
| 6 | PAWAN KUMAR, O. P. THAKUR, CHANDRA PRAKASH and T. C. GOEL. "Study of the structural and electrical properties of PMNT 68/32 ceramic prepared by a sol–gel process". <i>Phase Transitions</i> . vol.78, no.4, pp.329-336, Apr 2005. 10.1080/10241220500046083 |
| 7 | PAWAN KUMAR, SARABJIT SINGH, O. P. THAKUR, CHANDRA PRAKASH and T. C. GOEL. "Effect of compositional modifications on dielectric, ferroelectric and pyroelectric response of PMN-PT solid solutions near MPB". <i>Modern Physics Letters B</i> . vol.20, no.21, pp.1335-1342, Sep 2006. https://doi.org/10.1142/S0217984906011359 |
| 8 | Pawan Kumar, Chandra Prakash, O.P. Thakur, R. Chatterjee, T.C. Goel. "Dielectric, ferroelectric and pyroelectric properties of PMNT ceramics". <i>Physica B</i> 371 (2006). vol.371, pp.313–316, Jan 2006. 10.1016/j.physb.2005.10.107 |
| 9 | Pawan Kumar, Chandra Prakash, and T.C. Goel. "Dielectric and electrostrictive properties of PMNT near MPB". <i>Science and Technology of Advanced Materials</i> . vol.8, no.6, pp.463-468, 2007. 10.1016/j.stam.2007.05.007 |
| 10 | Pawan Kumar, Sonia, Raj Kishore Patel, Chandra S. Prakash, and Tara Chand Goel. "Effect of substrates on phase formation in PMN-PT 68/32 thin films by sol-gel process". <i>Materials Chemistry and Physics</i> . vol.110, no.1, pp.7-10, 2008. 10.1016/j.matchemphys.2007.11.035 |
| 11 | Pawan Kumar, Sonia, Raj Kishore Patel, and Chandra Prakash. "Low temperature perovskite phase formation in PCT 90/10 system by modified chemical route". <i>Applied Surface Science</i> . vol.255, no.11, pp.5686-5689, 2009. 10.1016/j.apsusc.2008.12.055 |
| 12 | Pawan Kumar, and P Palei. "Effect of sintering temperature on ferroelectric properties of 0.94(K 0.5Na0.5)NbO3-0.06LNbO3 system". <i>Ceramics International</i> . vol.36, no.5, pp.1725-1729, 2010. 10.1016/j.ceramint.2010.02.014 |
| 13 | Subir Roy, Sarabjit Singh, and Pawan Kumar. "Structural and dielectric properties of PMN-PT (65/35) bulk ceramics synthesized by metal-polymer gel auto ignition route". <i>Integrated Ferroelectrics: An International Journal</i> . vol.119, no.1, pp.82-88, 2010. 10.1080/10584587.2010.495663 |
| 14 | Pawan Kumar, and S N Kumar. "Characterization of PCT 76/24 ceramics synthesized by modified chemical route". <i>Integrated Ferroelectrics: An International Journal</i> . vol.118, no.1, pp.121-128, 2010. 10.1080/10584587.2010.489489 |
| 15 | Pawan Kumar, and Chandra Prakash. "Characterizations of PMNT 68/32 system synthesized by microwave technique". <i>Integrated Ferroelectrics: An International Journal</i> . vol.118, no.1, pp.114-120, 2010. 10.1080/10584587.2010.489488 |
| 16 | Pawan Kumar, and P Palei. "Dielectric and ferroelectric properties of Ag modified lead free 0.94[KNN]-0.06[LS] ceramics". <i>Integrated Ferroelectrics: An International Journal</i> . vol.121, no.1, pp.24-30, 2010. 10.1080/10584587.2010.491766 |
| 17 | S N Kumar, and Pawan Kumar. "Study of structural, dielectric and pyroelectric properties of modified PT system". <i>Physica B: Condensed Matter</i> . vol.405, no.13, pp.2869-2873, 2010. 10.1016/j.physb.2010.04.012 |

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| 18 | Sonia, Raj Kishore Patel, Pawan Kumar, and Chandra Prakash. "Synthesis and characterization of isovalent substituted BaTiO ₃ ceramics by modified chemical route". Integrated Ferroelectrics: An International Journal. vol.118, no.1, pp.106-113,2010. 10.1080/10584587.2010.503788 |
| 19 | Sonia Sharma, Raj Kishore Patel, C Prakash, and Pawan Kumar. "Structural, dielectric and ferroelectric study of microwave sintered lanthanum substituted BaTiO ₃ ceramics". Materials Chemistry and Physics. vol.130, no.1-2, pp.191-195,2011. 10.1016/j.matchemphys.2011.06.028 |
| 20 | Sonia, Raj Kishore Patel, C Prakash, and Pawan Kumar. "Effect of microwave processing on structural, dielectric and ferroelectric properties of calcium-doped BaTiO ₃ ceramics". Journal of Ceramic Processing Research. vol.12, no.6, pp.634-639,2011. |
| 21 | P. PALEI and P. KUMAR. "IMPEDANCE SPECTROSCOPY AND AC CONDUCTIVITY STUDIES OF FERROELECTRIC (K _{0.5} Na _{0.5})NbO ₃ CERAMICS". Journal of Advanced Dielectrics. vol.1, no.3, pp.351-356,Jul 2011. 10.1142/S2010135X11000446 |
| 22 | Palei P, Pawan Kumar, and Sonia S. "Temperature dependent electrical properties of 0.95[(K _{0.5} Na _{0.5})(1-x)Ag x NbO ₃]-0.05LiSbO ₃ ceramics". Journal of Electroceramics. vol.29, no.3, pp.211-215,2012. 10.1007/s10832-012-9764-x |
| 23 | Palei P, Pattanaik M, and Pawan Kumar. "Effect of oxygen sintering on the structural and electrical properties of KNN ceramics". Ceramics International. vol.38, no.1, pp.851-854,2012. 10.1016/j.ceramint.2011.05.162 |
| 24 | Palei P, and Pawan Kumar. "Effect of silver content on the phase transition and electrical properties of 0.95[(K _{0.5} Na _{0.5})NbO ₃]-0.05LiSbO ₃ ceramics". Solid State Sciences. vol.14, no.9, pp.1338-1342,2012. 10.1016/j.solidstatesciences.2012.07.025 |
| 25 | Mishra P, Pawan Kumar, and Sonia. "Effect of sintering temperature on dielectric, piezoelectric and ferroelectric properties of BZT-BCT 50/50 ceramics". Journal of Alloys and Compounds. vol.545, pp.210-215,2012. 10.1016/j.jallcom.2012.08.017 |
| 26 | Sonia Sharma, Pawan Kumar, and Palei P. "Dielectric and piezoelectric properties of low temperature synthesized iso-valent modified BT ceramics". Ceramics International. vol.38, no.7, pp.5597-5603,2012. 10.1016/j.ceramint.2012.03.079 |
| 27 | Kumar S N, and Pawan Kumar. "Dielectric and pyroelectric properties of ferroelectric SBN-PVDF composites prepared by hot-uniaxial press". International Journal of Applied Ceramic Technology. vol.10, no.s1, pp.E11-E17,2012. 10.1111/j.1744-7402.2012.02808.x |
| 28 | Palei P, Sonia, and Pawan Kumar. "Dielectric, ferroelectric and piezoelectric properties of (1-x)[K _{0.5} Na _{0.5} NbO ₃]-x[LiSbO ₃] ceramics". Journal of Physics and Chemistry of Solids. vol.73, no.7, pp.827-833,2012. 10.1016/j.jpics.2012.02.008 |
| 29 | Sonia, Patel R K, Pawan Kumar, Prakash C, and Agrawal D K. "Low temperature synthesis and dielectric, ferroelectric and piezoelectric study of microwave sintered BaTiO ₃ ceramics". Ceramics International. vol.38, no.2, pp.1585-1589,2012. 10.1016/j.ceramint.2011.09.045 |
| 30 | Prakash Kumar Palei, and Pawan Kumar. "Role of sintering temperature on the phase stability and electrical properties of 0.94(K _{0.5} Na _{0.5} NbO ₃)-0.06(LiSbO ₃) ceramics". Japanese Journal of Applied Physics. vol.51, no.1, 2012. 10.1143/JJAP.51.011503 |
| 31 | Prakash Palei, Pawan Kumar, and Dinesh K. Agrawal. "Structural and electrical properties of microwave processed Ag modified KNN-LS ceramics". Journal of Microwave Power and Electromagnetic Energy. vol.46, no.2, pp.76-82,2012. 10.1080/08327823.2012.11689826 |
| 32 | S.N.Kumar, Pawan Kumar, and D.K. Agrawal. "Structural, dielectric and ferroelectric properties of SBN ceramics synthesized by microwave reactive sintering technique". Ceramics International. vol.38, no.6, pp.5243-5250,2012. 10.1016/j.ceramint.2012.03.034 |
| 33 | V. Senthil & T. Badapanda & S. N. Kumar & P. Kumar & S. Panigrahi. "Relaxation and conduction mechanism of PVA: BYZT polymer composites by impedance spectroscopy". J Polym Res. vol.19:9838, Mar 2012. 10.1007/s10965-012-9838-0 |
| 34 | Mishra P, and Pawan Kumar. "Dielectric properties of 0.25(BZT-BCT)-0.75[(1-x)PVDF-xCCTO] (x=0.02, 0.04, 0.06, 0.08 and 0.1) composites for embedded capacitor applications". Composites Science and Technology. vol.88, pp.26-32,2013. 10.1016/j.compscitech.2013.08.020 |
| 35 | Mishra P, and Pawan Kumar. "Dielectric properties of F(BZT-BCT)-(1-F) epoxy composites with 0-3 connectivity". Advances in Condensed Matter Physics. 2013. 10.1155/2013/858406 |
| 36 | Swain S, Pawan Kumar, Dinesh K. Agrawal, and Sonia. "Dielectric and ferroelectric study of KNN modified NBT ceramics synthesized by microwave processing technique". Ceramics International. vol.39, no.3, pp.3205-3210,2013. 10.1016/j.ceramint.2012.10.005 |
| 37 | Kar S K, and Pawan Kumar. "Effect of microwave sintering on structural, morphological and dielectric properties of Ba(FeNb) _{0.5} O ₃ ceramics". Journal of Electroceramics. vol.31, no.3-4, pp.331-337,2013. 10.1007/s10832-013-9847-3 |
| 38 | Pawan Kumar, P. Mishra, and S. Sonia. "Synthesis and characterization of lead-free ferroelectric 0.5[Ba(Zr _{0.2} Ti _{0.8})O ₃]-0.5[(Ba _{0.7} Ca _{0.3})TiO ₃]-polyvinylidene difluoride 0-3 composites". Journal of Inorganic and Organometallic Polymers and Materials. vol.23, no.3, pp.539-545,2013. 10.1007/s10904-012-9809-2 |
| 39 | Pawan Kumar, M. Pattanaik, and Sonia. "Synthesis and characterizations of KNN ferroelectric ceramics near 50/50 MPB". Ceramics International. vol.39, no.1, pp.65-69,2013. 10.1016/j.ceramint.2012.05.093 |
| 40 | Roy S, Pawan Kumar, S. Singh, S. Bysakh, and V. V Bhanu Prasad. "Synthesis, consolidation and dielectric properties of BLT ceramics processed by M-PVA gel ignition technique". Advances in Applied Ceramics. vol.112, no.5, pp.263-269,2013. 10.1179/1743676112Y.0000000069 |
| 41 | Subrat.K.Kar, and Pawan Kumar. "Structural, morphological and dielectric study of Ba(FeNb) _{0.5} O ₃ ceramics synthesized by microwave processing technique". Journal of Physics and Chemistry of Solids. vol.74, no.10, pp.1408-1413,2013. 10.1016/j.jpics.2013.04.024 |

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| 42 | P Mishra, Sonia, and Pawan Kumar. "Enhanced dielectric and piezoelectric properties of BZT-BCT system near MPB". <i>Ceramics International</i> . vol.40, no.9 PART A, pp.14149-14157,2014. 10.1016/j.ceramint.2014.06.001 |
| 43 | P Mishra, and Pawan Kumar. "Enhancement of dielectric properties of 0.2[BZT-BCT]-0.8[(1 - X)epoxy-xCCTO] (x=0.02, 0.04, 0.06, 0.08 & 0.1) composites for embedded capacitor and energy harvesting applications". <i>Journal of Alloys and Compounds</i> . vol.617, pp.899-904,2014. 10.1016/j.jallcom.2014.08.029 |
| 44 | Swain S, and Pawan Kumar. "Dielectric, ferroelectric and bipolar electric field induced strain properties of MPB composition of NBT-xKNN system". <i>Journal of Electroceramics</i> . vol.32, no.1, pp.102-107,2014. 10.1007/s10832-013-9884-y |
| 45 | Sridevi Swain, Subrat Kumar Kar, and Pawan Kumar. "Dielectric, optical, piezoelectric and ferroelectric studies of NBT-BT ceramics near MPB". <i>Ceramics International</i> . vol.41, no.9, pp.10710–10717,2015. 10.1016/j.ceramint.2015.05.005 |
| 46 | Priyambada Nayak, Soumyaranjan Mohapatra, Pawan Kumar, and Simanchala Panigrahi. "Effect of Ba ²⁺ substitution on the structural and electrical properties of SrBi ₄ Ti ₄ O ₁₅ ceramic". <i>Ceramics International</i> . vol.41, no.8, pp.9361-9372,2015. 10.1016/j.ceramint.2015.03.309 |
| 47 | Sridevi Swain, Pawan Kumar, and Ram Bilash Choudhary. "Electrical and ferroelectric studies of the 2-layered SrBi ₂ Ta ₂ O ₉ based ceramics". <i>Physica B: Condensed Matter</i> . vol.477, pp.56-63,2015. 10.1016/j.physb.2015.08.008 |
| 48 | Subrat Kumar Kar, Sridevi Swain, Sonia, and Pawan Kumar. "High dielectric constant and low optical band gap studies of La-modified Ba(Fe _{0.5} Nb _{0.5})O ₃ ceramics". <i>Materials Chemistry and Physics</i> . vol.155, pp.171-177,2015. 10.1016/j.matchemphys.2015.02.021 |
| 49 | Punyatoya Mishra, and Pawan Kumar. "Structural, dielectric and optical properties of [(BZT-BCT)-(epoxy-CCTO)] composites". <i>Ceramics International</i> . vol.41, no.2, pp.2727-2734,2015. 10.1016/j.ceramint.2014.10.087 |
| 50 | Chandrasekhar M and Pawan Kumar. "Synthesis and characterizations of BNT-BT and BNT-BT-KNN ceramics for actuator and energy storage applications". <i>Ceramics International</i> . vol.41, no.4, pp.5574-5580,2015. 10.1016/j.ceramint.2014.12.136 |
| 51 | Chandrasekhar Mallam and Pawan Kumar. "Synthesis and characterizations of BNT–BT–KNN ceramics for energy storage applications". <i>Phase Transitions</i> . vol.89, no.9, pp.944-957,2015. 10.1080/01411594.2015.1118763 |
| 52 | Poonam Kumari, Pawan Kumar & Radheshyam Rai. "Study the Structural and Dielectric Properties of Rare-Earth La Doped (Ba _{1-x} La _x) (Ti _{0.815} Mn _{0.0025} Nb _{0.0025} Zr _{0.18}) _{0.995} O ₃ Ceramics". <i>Integrated Ferroelectrics</i> . vol.167, no.1, pp.24-34,Nov 2015. 10.1080/10584587.2015.1105067 |
| 53 | Chandrasekhar Mallam, Sonia, and Pawan Kumar. "Synthesis and characterizations of NaNbO ₃ modified BNT–BT–BKT ceramics for energy storage applications". <i>Physica B: Condensed Matter</i> . vol.497, pp.59-66,2016. 10.1016/j.physb.2016.06.015 |
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