Publications of Dr. Arijit Baral

(a) Paper published in International Journals: 47

S.No	Author(s)	Title	Name of Journal	Volume	Page	Year
1.	C.M. Banerjee D. Mishra A.Baral S.Chakravorti	Compensating the Impact of Residual Energy on Time Domain Dielectric Response using Time-Varying Model	IEEE Sensors Journal	Accepted, Paper ID: Sensors-87196-2025		2025
2	V.K.Raushan S.Ganguly A.Baral S.Chakravorti	A Model with Time-Varying Parameters for Condition Assessment of Transformer Oil	IEEE Instrumentation & Measurements Magazine	In Press, Paper No. IMM-D-24-00117		2024
3	S. Ganguly A. Baral S. Chakravorti	Effect of Charges Freed from Shallow and Deep Traps on Dielectric Response and Associated Insulation Diagnosis	IEEE Transactions on Dielectrics and Electrical Insulation	(Early Access); DOI: 10.1109/TDEI.2024.3510227		2024
4.	S. Ganguly A. Baral S. Chakravorti	Power Transformer Insulation Diagnosis Using De-Trapped Charge Affected Short-Duration Dielectric Response	IEEE Transactions on Instrumentation and Measurement	Vol. 69 No. 10	7695 - 7702	2024
5	S. Ganguly C.M. Banerjee A. Baral S. Chakravorti	Use of Modified TVM Parameters for Reliable Estimation of Power Transformer Insulation Condition	IEEE Transactions on Instrumentation and Measurement	Vol. 72	1- 11	2023
6	D. Mishra S. Parveen A. Baral S. Chakravorti	Reliable Sensing of Insulation Sensitive Performance Parameters Using Time Domain-Based Measurement at Different Temperature	IEEE Sensors Journal	Vol. 23, No. 20	25411 - 25419	2023
7	D. Mishra A. Baral S. Chakravorti	A Non-linear Regression Based Approach to Assess Transformer Insulation Condition Using Dielectric Response Recorded for Short Duration	IEEE Transactions on Instrumentation and Measurement	Vol. 72	1-9	2023
8	A. Kumar D. Mishra A. Baral	Importance of Depolarization Current in the Diagnosis of Oil-Paper Insulation of Power Transformer	IEEE Access	Vol. 11	56858 - 56864	2023
9	D. Mishra A. Baral S. Chakravorti	Reliable Assessment of Oil-Paper Insulation Used in Power Transformer Using Concise Dielectric Response Measurement	IEEE Transactions on Dielectrics and Electrical Insulation	Vol. 30, No. 03	1255-1264	2023
10	S. Dasgupta, A. Baral, A. Lahiri	Optimization of Electrode-Spacer Arrangement Using Simplex Algorithm	IEEE Transactions on Dielectrics and Electrical Insulation	Vol. 30, No. 02	726-733	2023
11	S. Dasgupta, A. Baral, A. Lahiri	Optimization of Electric Stress in a Vacuum Interrupter Using Charnes' Big M Algorithm	IEEE Transactions on Dielectrics and Electrical Insulation	Vol. 30, No. 02	877-882	2023
12	S. Mishra, A. Baral, S. Chakravorti,	Health Assessment of Oil-paper Insulation using Short Duration Frequency Domain Response	IEEE Transactions on Dielectrics and Electrical Insulation	Vol. 29, No. 06	2370-2378	2022
13	D. Mishra A. Baral S. Chakravorti	A Novel and Fast Approach for Sensing Activation Energy for Reliable Health Assessment of Power Transformer	IEEE Sensors Journal	Vol. 22, No. 21	21145-21152	2022
14	S. Dasgupta, A. Baral, A. Lahiri	Estimation of Electric Stress in a Vacuum Interrupter using Multiple Linear Regression	IEEE Transactions on Dielectrics and Electrical Insulation	Vol. 29, No 3	859-865	2022

15	S. Mishra, A. Baral, D. Mishra, S. Chakravorti,	A Novel Method to Predict Severity of Thermal Aging and Degree of Polymerization for Reliable Diagnosis of Dry-Type Insulation	IEEE Transactions on Dielectrics and Electrical Insulation	Vol. 29, No 2	631-640	2022
16	C.M Banerjee, A. Baral, S. Chakravorti	Influence of De-trapped Charge Polarity in Sensing Health of Power Transformer Insulation	IEEE Sensors Journal	Vol. 22, No 7	6706-6716	2022
17	S.Dutta, J. Dey D.Mishra, A.Baral, S.Chakravorti	Prediction of Insulation Sensitive Parameters of Power Transformer using Detrended Fluctuation Analysis Based Method	IEEE Transactions on Power Delivery	Vol. 37, No 3	1963-1973	2021
18	A.K. Pal A. Baral A. Lahiri	Studies on Prospect of HTV Silicone Rubber as Dielectric Material when Reinforced with TiO_2 Nano Particles	IET Science, Measurement & Technology,	Vol. 15, No 3	292-301	2021
19	D. Mishra, R. Verma, A. Baral S. Chakravorti,	Investigation Related to Performance Parameter Estimation of Power Transformer Insulation Using Interfacial Charge	IEEE Transactions on Dielectrics and Electrical Insulation	Vol. 27, No. 4	1247-1255	2020
20	S.Dutta, D.Mishra, A.Baral, S.Chakravorti	Estimation of de-trapped charge for diagnosis of transformer insulation using short-duration polarization current employing detrended fluctuation analysis	IET High Voltage	Vol. 5, No. 5	636-641	2020
21	C.M Banerjee, A. Baral, S. Chakravorti	De-Trapped Charge Affected Depolarization Current Estimation using Short-Duration Dielectric Response for Diagnosis of Transformer Insulation.	IEEE Transactions on Instrumentation and Measurement	Vol. 69, No. 10	7695-7702	2020
22	D. Mishra, A. Baral, S. Chakravorti	De-noising of Time Domain Spectroscopy Data for Reliable Assessment of Power Transformer Insulation	IET Generation Transmission & Distribution,	Vol. 14, No. 8	1500-1507	2020
23	C.M. Banerjee, A. Baral, S. Chakravorti	Effective Analysis of Time Domain Dielectric Response for Reliable Diagnosis of Power Transformer Insulation using Statistical Parameter Evaluated from Time-Varying Model	IET Science, Measurement & Technology,	Vol. 14, No. 1	48-55	2020
24	D. Mishra, A. Baral, N. Haque, S.Chakravorti	Condition Assessment of Power Transformer Insulation Using Short Duration Time Domain Dielectric Spectroscopy Measurement Data	IEEE Transactions on Instrumentation and Measurement	Vol. 69, No. 7	4404-4411	2020
25	D. Mishra, S. Dutta, A. Baral, N. Haque, S. Chakravorti	Use of Interfacial Charge for Diagnosis and Activation Energy Prediction of Oil-paper Insulation used in Power Transformer	IEEE Transactions on Power Delivery	Vol. 34, No. 4	1332-1340	2019
26	C.M. Banerjee, S. Dutta, A. Baral, S. Chakravorti	Time Varying Model for effective Diagnosis of Oil-Paper Insulation used in Power Transformers	IET Generation Transmission & Distribution,	Vol: 13 , No: 9	1527 - 1534	2019
27	S. Dutta, C.M. Banerjee, A. Baral, B. Chatterjee, S. Dalai S. Chakravorti	Neural Network based methodology to study Effects of Oil Properties on Induction Period Evaluated from Response of Oil Paper Insulation Employing mineral oil, ester and mixture	IET Science, Measurement & Technology	Vol: 13 , No: 4	606 - 613	2019

28	M. Banerjee, S Dutta, A. Baral, S. Chakravorti	Influence of Charging Voltage Magnitude on Time Domain Dielectric Response of Oil-paper Insulation	IET Science, Measurement & Technology,	Vol: 13 , No: 6	874 - 882	2019
29	S. Dutta, D. Mishra, N. Haque, A.K. Pradhan, A. Baral, S. Chakravorti	Influence of temperature on interfacial charge of power transformer insulation	IET Science, Measurement & Technology,	Vol: 13 , No: 7	1059 - 1067	2019
30	D. Mishra, N. Haque, A. Baral, S. Chakravorti	Estimation of Paper Conductivity from Short Duration Polarization Depolarization Current for Diagnosis of Power Transformer	IET Science, Measurement & Technology,	Vol: 13 , No: 8	1178-1185	2019
31	D.Mishra A. Baral, S.Chakravorti	Compensating the Effect of Residual Dipole Energy on Dielectric Response for Effective Diagnosis of Power Transformer Insulation	IET Science, Measurement & Technology,	Vol. 12, No. 3	314-322	2018
32	D.Mishra N.Haque A. Baral, S.Chakravorti	Effect of Charge Accumulated at Oil-Paper Interface on Parameters Considered for Power Transformer Insulation Diagnosis	IET Science, Measurement & Technology,	Vol. 12, No. 3	411-417	2018
33	A.Kumar H.C. Verma A. Baral, A.K. Pradhan S. Chakravorti	Estimation of Paper-Moisture in Transformer Insulation Employing Dielectric Spectroscopy Data	IET Science, Measurement & Technology,	Vol. 12, No. 4	536-541	2018
34	D.Mishra A.K.Pradhan A. Baral, S.Chakravorti	Reduction of Time Domain Insulation Response Measurement Duration for Fast and Effective Diagnosis of Power Transformer	IEEE Transactions on Dielectrics and Electrical Insulation	Vol. 25, No. 5	1932-1940	2018
35	M. Mukherjee, A.K. Pradhan A. Baral, S. Chakravorti	A Modified Maxwell Model for Modeling Dielectric Response of Oil-paper Insulation Affected by Radial and Axial Temperature Gradients	IEEE Transactions on Dielectrics and Electrical Insulation	Vol. 24, No 2	1000-1009	2017
36	D.Mishra N.Haque A. Baral, S.Chakravorti	Assessment of Interfacial Charge Accumulation in Oil-Paper Interface in Transformer Insulation from Polarization-Depolarization Current Measurements	IEEE Transactions on Dielectrics and Electrical Insulation	Vol. 24, No 3	1665-1673	2017
37	H.C.Verma A. Baral, A.K.Pradhan S.Chakravorti	A Method to Estimate Activation Energy of Power Transformer Insulation Using Time Domain Spectroscopy Data	IEEE Transactions on Dielectrics and Electrical Insulation	Vol. 24, No 5	3245-3253	2017
38	S.Dutta A. Baral, A.K.Pradhan S.Chakravorti	Effect of Measurement Temperature on Power Transformer Insulation Diagnosis using Frequency Domain Spectroscopy	IET Science, Measurement & Technology,	Vol. 11, No. 6	773-779	2017
39	H.C.Verma A.K.Pradhan A. Baral, S.Chakravorti	Condition Assessment of Various Regions within Non-uniformly aged Cellulosic Insulation of Power Transformer using Modified Debye Model	IET Science, Measurement & Technology,	Vol. 11, No. 7	939-947	2017
40	P. Sarkar, A. Baral, K. Bhattacharya, P. Syam	An Ant Colony System Based Control of Shunt Capacitor Banks for Bulk Electricity Consumers	Applied Soft Computing, Elsevier Publ.	Vol. 43	520-534	2016
41	A. Baral, S. Chakravorti	Compensating the Effect of Temperature Variation on Dielectric Response of Oil-paper Insulation used in Power Transformers	IEEE Transactions on Dielectrics and Electrical Insulation	Vol. 23, No. 4	2462-2474	2016

42	S. Sarkar; T. Sharma; A. Baral, B. Chatterjee; D. Dey; S. Chakravorti	An Expert System Approach for Transformer Insulation Diagnosis combining Conventional Diagnostic Tests and PDC, RVM Data	IEEE Transactions on Dielectrics and Electrical Insulation	Vol. 21, No. 2	882-891	2014
43	A. Baral, S. Chakravorti	Condition Assessment of Cellulosic Part in Power Transformer Insulation using Transfer Function Zero of Modified Debye Model	IEEE Transactions on Dielectrics and Electrical Insulation	Vol. 21, No. 5	2028-2036	2014
44	A. Baral, S. Chakravorti	Prediction of Moisture present in Cellulosic Part of Power Transformer Insulation using Transfer Function of Modified Debye Model	IEEE Transactions on Dielectrics and Electrical Insulation	Vol. 21, No. 3	1368-1375	2014
45	A. Baral, S. Chakravorti	A Modified Maxwell Model for Characterization of Relaxation Processes within Insulation System having Non-uniform Aging due to Temperature Gradient	IEEE Transactions on Dielectrics and Electrical Insulation	Vol. 2, No. 20	524 to 534	2013
46	A. Baral, S. Chakravorti	Assessment of Non-Uniform Aging of Solid Dielectric using System Poles of a Modified Debye Model for Oil-paper Insulation of Transformers	IEEE Transactions on Dielectrics and Electrical Insulation	Vol. 20, No. 5	1922-1933	2013
47	S. Sarkar; T. Sharma; A. Baral, B. Chatterjee; D. Dey; S. Chakravorti	A new approach for determination of moisture in paper insulation of in-situ power transformers by combining Polarization-Depolarization Current and Return Voltage Measurement results	IEEE Transactions on Dielectrics and Electrical Insulation	Vol. 20, No. 6	2325-2334	2013

b) Book Chapters: 03

S. No.	Chapter Title	Book Title	Publisher	Co-author(s), if any
1	Thermal model parameters identification of power transformer using nature inspired optimization algorithms	Smart Innovations in Communication and Computational Sciences	Springer, 2018	A.Mala; C.M.Banerjee; S.Chakravorti
2	Moisture Estimation of Power Transformer Using Transfer Function of Conventional Debye Model	Lecture Notes in Electrical Engineering, Vol 817	Springer, 2022	C.M. Banerjee, A. Baral S. Chakravorti
3	Application of Wavelet Neural Network for Electric Field Estimation	Lecture Notes in Electrical Engineering, Vol 984	Springer, 2023	S. Dasgupta, A. Baral, A. Lahiri

(c) Paper published in International Conferences: 38

S. No.	Title of Paper	Co-author(s), if any	Name of the Conference	Year
1	ACS Based Optimization Technique for SVC Control	K. Das (Bhattacharya), P. Sarkar, D. Ghosh	Int. Conference on Advanced Computational Engg. and Experimentation Methods, Rome, Italy	2009
2	Development of a Smart Energy Saving Device Based on Ant Colony System	P.Sarkar, K. Das (Bhattacharya), D. Ghosh, P.Syam	International Conference on Power Systems, 2009. ICPS '09.	2009
3	An Integrated Method for Numerical Computation of Electric Field Using Parametric CAD Module	A. Lahiri	International Conference on Power, Signals, Controls and Computation (EPSCICON)	2012

4	Condition Assessment of in-situ Generator Transformers by Frequency Domain Analysis using Time Domain data	S. Sarkar, T. Sharma, B. Chatterjee, P. Rajamani, D. Dey, S. Chakravorti	10th International Conference on Properties and Application of Dielectric Materials (ICPADM)	2012
5	Denoising Neutral Current of a Power Transformer Measured During Impulse Test by Framelet Technique	R. Misra, A. Lahiri	10th International Conference on Properties and Application of Dielectric Materials (ICPADM)	2012
6	A Novel Methodology for on-site Validation of RV Measurement Data	S. Sarkar, T. Sharma, B. Chatterjee, P. Rajamani, D.Dey, S. Chakravorti	1st International Conference on Power and Energy in NERIST (ICPEN)	2012
7	Applicability of Stockwell Transform in Diagnosing Impulse Faults of a Transformer	A. Lahiri	1st International Conference on Power and Energy in NERIST (ICPEN)	2012
8	Application of Framelet Transform in Filtering Baseline Drift from ECG Signals	A. Sanyal, A. Lahiri	Procedia Technology, Elsevier Publ.	2012
9	Condition Assessment of Oil-Paper Insulation in Large Power Equipment using Transfer Function Zero of Debye Model	S. Chakravorti	IEEE 1st International Conference on Condition Assessment Techniques in Electrical Systems (CATCON-2013)	2013
10	Extracting Aging Sensitive Information from Transfer Function of Debye Model for Condition Assessment of Oil-Paper Insulation	S. Chakravorti	2nd International Conference on Power, Control and Embedded Systems, (ICPCES – 2014)	2014
11	Condition Assessment of Oil-paper Insulation used in Power Transformer based on Polarization Energy	M. Mukherjee A.K. Pradhan S. Chakravorti	IEEE 2nd International Conference on Condition Assessment Techniques in Electrical Systems (CATCON-2015)	2015
12	Identification of Lyapunov Function for Testing Stability of Nonlinear Systems using BFO	C.M. Bannerjee	3rd International Conference on Foundations & Frontiers in Computer, Communication and Electrical Engineering – 2016 (C2E2 – 2016)	2016
13	Effect of Slow Decaying Trapped Charge on PDC Data and Associated Diagnosis of Power Transformer Insulation	N. Verma	3rd International Conference on Foundations & Frontiers in Computer, Communication and Electrical Engineering – 2016 (C2E2 – 2016)	2016
14	Electric Stress Control on Post-Type Porcelain Insulators Using a Coating of RTV Silicone Rubber with BaTiO3 Nanofillers	A.K. Pal A. Lahiri	3rd International Conference on Foundations & Frontiers in Computer, Communication and Electrical Engineering – 2016 (C2E2 – 2016)	2016
15	Optimization of Electrode-Spacer Geometry of a Gas Insulated System	S. Dasgupta A. Lahiri	3rd International Conference on Foundations & Frontiers in Computer, Communication and Electrical Engineering – 2016 (C2E2 – 2016)	2016
16	Study of Electric and Thermal Stress Distribution using Boron Nitride with Silicone Rubber in HV Cable Termination	M. Basu V. Gupta A. Lahiri	3rd International Conference on Foundations & Frontiers in Computer, Communication and Electrical Engineering – 2016 (C2E2 – 2016)	2016
17	Classification of Power System Faults using Voltage Concordia Pattern Feature Aided PNN	S. Mishra	6th IEEE International Conference on Power Systems, 2016 (ICPS 2016)	2016
18	Effect of Measurement Temperature on Transfer Function Zero Evaluated for Condition Assessment of Oil-Paper Insulation	Saurabh; C.M.Banerjee; S.Chakravorti	2017 3rd International Conference on Condition Assessment Techniques in Electrical Systems (CATCON)	2017
19	Influence of Insulation Model Parameters on Transfer Function Zero Evaluated for Diagnosis of Oil-paper Insulation	C.M.Banerjee; Saurabh; S.Chakravorti	2017 3rd International Conference on Condition Assessment Techniques in Electrical Systems (CATCON)	2017

20	Effect of Charge Accumulated at Oil-Paper Interface on Zero of Transfer Function Formulated Using Classical Debye Model Parameters	D. Mishra; A. K. Pradhan; N. Haque; S. Chakravorti	2017 3rd International Conference on Condition Assessment Techniques in Electrical Systems (CATCON)	2017
21	Effect of Interfacial charge on Parameters Considered for Insulation Diagnosis of Power Transformer	D.Mishra; A.K.Pradhan; N.Haque; S.Chakravorti	2017 IEEE Calcutta Conference (CALCON)	2017
22	Effect of introduced charge on frequency domain dielectric response of oil-paper insulation	V. Rajput; A.Kumar; S.Chakravorti	2017 IEEE Calcutta Conference (CALCON)	2017
23	Development of a Low Cost Portable Frequency Domain Spectroscopy Data Measurement Module for Oil-paper Insulation	M.Malviya, H.C.Verma, S.Chakravorti	7th International Conference on Power Systems, 2017 (ICPS 2017)	2017
24	A Novel Method to Predict Moisture in Cellulosic Insulation of Power Transformer with Improved Accuracy Using Time Domain Spectroscopy Data	R.Goel, H.C.Verma, S.Chakravorti	6th IEEE International Conference on Computer Application in Electrical Engineering - Recent Advances, 2017	2017
25	Comparison of Different Methods Available for Evaluating Remaining Life of OIP Insulation Used in Power Transformers	A. Kumari, H.C. Verma, S.Chakravorti	6th IEEE International Conference on Computer Application in Electrical Engineering - Recent Advances, 2017	2017
26	De-noising of polarization current for effective Diagnosis of power transformer insulation	N.Bisht, D.Mishra, S.Chakravorti	6th International conference on large power transformer Modern Trend in Insulation, Operation and Maintenance	2017
27	Influence of Volume Concentration on Breakdown Strength of Synthetic Ester Based Transformer Nanofluids Employing SiO_2 Nanoparticle	S Chaudhary H.C Verma	3rd International Conference for Convergence in Technology	2018
28	Effect of Measurement Temperature on Interfacial Charge Freed from Deep Traps Located at the Interface of Oil-Paper Insulation	D. Dey, A. Sarkar, S. Pal, A. Kumar, D. Mishra, N. Haque S. Chakravorti	1st IEEE Conference on Applied Signal Processing (ASPCON 2018)	2018
29	Effect of Measurement Temperature of Insulation Poles Used for Assessment of Oil-paper Insulation	R. Verma, D. Mishra, S. Chakravorti	1st IEEE Conference on Applied Signal Processing (ASPCON 2018)	2018
30	Feasibility of Using Normalized De-trapped Charge for Diagnosis of Power Transformer Insulation	D. Mishra, S. Chakravorti	IEEE PES Asia-Pacific Power and Energy Engineering Conference (APPEEC)	2018
31	Leakage Current Based Analysis of Suspension Insulator for Effective Determination of ESDD	J. Dey, S.Dutta, S. Chakravorti	8th International Conference on Power Systems (ICPS 2019)	2019
32	A Method to Predict Degree of Polymerization Value of Oil-paper Insulation Using Interfacial charge	V.Singh, D.Mishra, S. Chakravorti	8th International Conference on Power Systems (ICPS 2019)	2019
33	Effect of Tower Footing Resistance on Back Flashover for a Double Circuit Line	P.Das	8th International Conference on Power Systems (ICPS 2019)	2019
34	Condition Monitoring of Power Transformer Insulation by Return Voltage Measurement	Gajanand soni, Saurabh Dutta	5th IEEE International Conference on Condition Assessment Techniques in Electrical Systems (CATCON)	2021
35	Prediction of Suspension Insulator Condition Using Harmonics Ratio Based Method	Md Shahajahan, Saurabh Dutta	5th IEEE International Conference on Condition Assessment Techniques in Electrical Systems (CATCON)	2021

36	Diagnosis of Oil Paper Sample Using Capacitance Profile of Time Varying Model	Ankita Garg, C.M Banerjee, Sivaji Chakravorti	5th IEEE International Conference on Condition Assessment Techniques in Electrical Systems (CATCON)	2021
37	Influence of Temperature Transient on Frequency Domain Dielectric Response of Oil-Paper Sample	Ankita Garg, C.M Banerjee, Sivaji Chakravorti	5th IEEE International Conference on Condition Assessment Techniques in Electrical Systems (CATCON)	2021
38	Harmonic Ratio and Detrended Fluctuation Analysis Aided Reliable Estimation of contamination Level On Outdoor Suspension Insulators	Padam Dhar Dwivedi Saurabh Dutta	2nd International Conference on Intelligent Technologies (CONIT)	2022

(d) Paper published in National Conferences: 05

S. No.	Title of Paper	Co-author(s), if any	Name of the Conference	Year
1	A Comparative Study of ANN-Aided Schemes for Electric Field Optimization in Three Dimensional Systems	S.Banerjee, A.Lahiri, S.Chakravorti, K.Bhattacharya	14th National Power System Conference (NPSC)	2006
2	Studies on Correlation between parameters of PDC and RV Measurements carried out on Power Transformers	S. Sarkar, T. Sharma, B. Chatterjee, P. Rajamani, D. Dey, S. Chakravorti	IISc Centenary Conference - EE	2011
3	Application of S-Transform for Removing Baseline Drift from ECG	A. Sanyal A. Lahiri	2nd National Conference on Computational Intelligence and Signal Processing (CISP2012)	2012
4	Effect of temperature on condition assessment of oil-paper insulation using polarization-depolarization current	Saurabh Dutta; M.Mukherjee; A.K.Pradhan; S.Chakravorti	2016 National Power Systems Conference (NPSC)	2016
5	Impact of temperature transient on frequency domain dielectric response of oil paper insulation	A. Mondal, C.M. Banerjee	National Conference on Sustainable Energy	2018

List of Copyrights / Patents

- Copyright (**granted**) on "TRINA-XS", a software developed to assess the condition of Power Transformer insulation, Registration number: SW-7983/2014 dated 06/06/2014.

- Indian patent (**granted**) "A High Frequency Modified Half Bridge Resonant Inverter with AC Input Source" (Patent no. 341969 vide Application No: 1321/KOL/2014, dated 17/12/2014). Inventor: P. K. Sadhu, P. Pal, N. Pal and A. Baral.

- Indian patent (**granted**) "A High Frequency Full Bridge Series Resonant Inverter with AC Input Source", (Patent no. 393014 vide Application No :1081/KOL/2014, dated 24/10/2014). Inventor: P.K. Sadhu, D. Roy, N. Pal and A. Baral.

- Indian patent (**granted**) "A Hybrid Particulate Matter (PM) Emission Control Device Having Electrostatic Precipitator and High Frequency Induction Heating Coil for Diesel Engine and Method for the Same", (Patent no. 400850 vide Application No : 201731025438, Dated 18/07/2017). Inventors: K. Sit, P.K. Sadhu, A. Baral, K. Bhaumik, M. Chakraborty, S. Chakraborty and N. Pal.

- Applied Indian patent "A hybrid renewable energy driven bidirectional wireless charging system for dynamic and static electric vehicle", (Application No. 202231032196 dated 06/06/2022), Inventors: P.K. Sadhu, A. Goswami, S. Mishra, N. Pal, A. Baral, A. Ghoshal, K.C. Jana

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