

HAREKRUSHNA SUTAR

Assistant Professor



Personal Information:

Date of Birth: 02/07/1982.

Sex: Male

Nationality: Indian

Religion: Hinduism.

Marital Status: Married (one Child)

Contact Information:

OFFICE:

Assistant Professor

Chemical Engineering Department,

Indira Gandhi Institute of Technology, Sarang, District-Dhenkanal, Odisha, India,

Pin-759146. (Fully Autonomous College, Govt. of Odisha)

(Affiliated to Biju Patnaik University of Technology, Rourkela, India)

RESIDENCE:

Dalimba Bhawan, In front of Gadatala Regional College, Bipini Colony, District-Angul, Odisha, India, Pin-759101

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Educational Qualification:

- **PhD** (Engineering): Jadavpur University, Kolkata, India, 2019.
Thesis Title: [Study of Tribological Behavior of Plasma Sprayed Red Mud Composite Coatings on mild steel.](#)
- **M.Chem.Engg**: Jadavpur University, Kolkata, India, 2009
Thesis Title: [Characterisation of Red mud-Aluminium Metal matrix composite prepared by stir casting method.](#)

- **B.E** (Chemical Engineering):
Indira Gandhi Institute of Technology, Sarang, India.
Fully Autonomous College of Government of Odisha, India
(**Utkal University**), Bhubaneswar, Odisha, India, 2005
- **Diploma** (Chemical Engineering)
Utkalmani Gopabandhu Institute of Engineering, Rourkela, 2001.
(SCTE and VT, Odisha)

OVERVIEW OF PhD RESEARCH WORK CONDUCTED

In my PhD work I was associated in the project entitled: **Study of tribological behaviour of plasma sprayed red mud composite coatings on mild steel**. I was engaged in doing research and publishing journal papers. The research work was to develop a **ceramic coating** like pure **red mud** on mild steel by plasma spraying technology. Red mud is compounded with varying weight % of **fly ash, aluminium and carbon** separately to form its composite and plasma sprayed at different spraying power namely 6, 9, 12 and 15 kW. The investigation has focused to determine the coating feasibility towards **dry sliding wear** using pin on disc tribometer. Different **mechanical properties** like hardness, coating porosity, deposition efficiency, adhesion strength are evaluated. **Micro-structural** characteristics of these coatings; such as surface morphology and coating thickness are investigated by using SEM and FESEM. Occurrence of **phase transformations** during spraying is examined by XRD and elemental analysis. **Thermal behaviour** of the coatings is determined by performing DSC and TGA experiments at elevated temperatures. The compatibility of these coatings towards high temperature up to 1000°C is checked by evaluating their adhesion strengths. In order to understand the effect of heat treatment on the surface topography of the coatings, SEM and FESEM tests are employed after exposing coatings to high temperature atmosphere. Morphology of the coatings by means of SEM and FESEM is

observed after sliding wear tests at different sliding times to evaluate the sliding mechanisms from the analysis of wear morphologies. Finally experimental results are optimized by **Taguchi Optimization** technique to identify the significant factors or interactions that influence the wear rate.

CURRENT RESEARCH STATEMENT:

My Current Research focusing particularly to **thermoplastic polymers** and for the last three years I am working on it. I have completed a research project by blending high density polyethylene (**HDPE**) and polypropylene (**PP**) by extrusion and injection moulding methods and verified the non compatibility of the polymers. Different mechanical, thermo mechanical, dynamic mechanical, thermal, electrical and crystallisation characteristics of the composite are studied. Investigations are also done to study the effect of strain rate on tensile properties of the HDPE/PP composite. At present I am working to study the engineering applications of **PP/Graphene Nano Platelets (GnPs)/Copper nano-composite** and **PP-Multi walled carbon Nano tube (MWCNTs)** composites. Simultaneously I am associated with a research on **Sulfonated Polyether Ether Ketone (SPEEK) polymer membrane for fuel cell application**.

Experience :

- A. **Worked** as Technical Assistant at **National Institute of Technology**, Rourkela, India for **one** year. 2006-2007
- B. **Worked** as Scientific Officer-C at **Bhabha Atomic Research Centre**, Bombay, India for **three** year. 2009-2012
- C. **Worked** as research Fellow at **National Institute of Technology**, Rourkela, India for **two** year. 2012-2014.
- D. **Working** as Assistant Professor at **Indira Gandhi Institute of Technology**, Sarang, India from the last **five** Years. 8TH August 2014-Till date

Member of Professional Bodies:

- Life Member of [Institution of Engineers](#) (India), MIE (I), Membership Number: **M-147475-2**.
- Life Member of [International Association of Engineers](#) (IAENG), USA, Membership Number: **118128**.
- Life Member of [International Association of Computer science and information Technology](#), Membership Number: **80342622**, (IACSIT), Singapore
- Life Member of [Indian Institute of Chemical Engineers](#), IChE.

Research Interest:

- ✓ Tribology.
- ✓ Thin film and surface Coating.
- ✓ Composite materials.
- ✓ Fluidization, Water treatment.
- ✓ Polymer Technology
- ✓ Polymer Blends
- ✓ Bio-Polymer

Publications:

➤ From doctoral Thesis:

- [1] Thermal and Dry Sliding Wear Behavior of Plasma Sprayed Red Mud-Fly Ash Coatings on Mild Steel; **H. Sutar**, D. Roy, S.C Mishra, S. Patra, R. Murmu; *Tribology in Industry*, **40(1)**, 117-128, 2018.
- [2] Morphology and solid particle erosion wear behavior of red mud composite coatings. **H. Sutar**, SC Mishra, S.K Sahoo, A Satapathy and V Kumar. *Natural Science*, **4(11)**, 832-838, 2012.
- [3] Progress of Red Mud Utilization: An Overview, **H. Sutar**, S.C. Mishra, S.K. Sahoo, A. Chakraverty and H. Maharana, *American Chemical Science Journal*, **4(3)**, 255-279, 2014.
- [4] Tribological Aspects of Thermally Sprayed Red Mud-Fly Ash and Red Mud-Al Coatings on Mild Steel: **H. Sutar**, S. C Mishra, S. K Sahoo, H. S Maharana and A. P Chakraverty, *American Chemical Science Journal*, **4(6)**, 1014-1031, 2014.

- [5] Friction and Wear Behaviour of Plasma Sprayed Fly Ash Added Red Mud Coatings: H. Sutar, D. Roy, S. C. Mishra, A. P. Chakraverty and H. Maharana; *Physical Science International Journal*, **5(1)**, 61-73, 2014.
- [6] Effect of fly ash and carbon reinforcement on dry sliding wear behaviour of red mud; H. Sutar, D. Roy and S.C Mishra; *Indian Journal of Materials Science*, **2015, 1-7**, 2015.
- [7] Sliding Wear Performance Evaluation of Red Mud (RM), RM + Fly Ash (FA) and RM + FA + Al Coatings on Mild Steel; H. Sutar, D. Roy, S.C Mishra, R. Murmu; *Materials Sciences and Applications*, **7(3)**, 171-179, 2016.
- [8] Plasma Sprayed Red Mud-Fly Ash Composite Coatings on Mild Steel: A Comprehensive Outline; H. Sutar, R. Murmu, D. Roy, S.C Mishra; *Advances and Trends in Physical Science Research*, Vol-2, Chapter-13, 154-177, 2019. (BOOK CHAPTER).
- [9] Characterization of Plasma Sprayed Pure Red Mud Coatings: An Analysis; A. Satapathy, H. Sutar, S.C Mishra and S.K Sahoo; *American Chemical Science Journal*, **3(2)**, 151-163, 2013.
- [10] Wettability, Thermal and Sliding Behavior of Thermally Sprayed Fly Ash Premixed Red Mud Coatings on Mild Steel, H. Sutar, B. Mishra, R. Murmu, S. Patra, S.C. Patra, S.C. Mishra, D. Roy; *Materials Sciences and Applications*, **11(1)**, 12-26.
- [11] Study of Sliding Wear Behavior of Plasma Sprayed Red Mud Composite Coatings on Mild Steel, H. Sutar, D. Roy, S.C Mishra, R. Murmu; **FIRST EDITION 2019, ISBN 978-93-89816-04-4 (Print), ISBN 978-93-89816-05-1 (eBook), DOI: 10.9734/bpi/mono/978-93-89816-04-4**, BOOK Publisher International. (FULL BOOK)

➤ **PUBLICATION BY INDEPENDENT RESEARCH:**

- [1] Surface erosion behaviour over NiCrBSi-Al₂O₃ composite coatings; P. Senapati, H. Sutar (2020), *Materials Research Express*, **7 (7)**, 076512.
- [2] A Review on the Dominant Factors Affecting Silt Erosion in Hydro Turbines; P. Senapati, H. Sutar (2020), *International Journal on Emerging Technology*, **11(4)**, 263-268.

- [3] Graphene Oxide (GO) Supported Palladium (Pd) Nanocomposites for Enhanced Hydrogenation; D. Rout, P. Senapati, **H. Sutar**, D.C. Sau and R. Murmu (2019) *Graphene*, **8(3)**, 33-51, 2019.
- [4] Mechanical, Thermal and Crystallization Properties of Polypropylene (PP) Reinforced Composites with High Density Polyethylene (HDPE) as Matrix; **H. Sutar**, PC Sahoo, PS Sahu, S Sahoo, R Murmu, S Swain, SC Mishra; *Materials Sciences and Applications*, **9(5)**, 502-515, 2018.
- [5] Electrical Behaviour and Spherulites Morphology of HDPE/PP Polyblends with HDPE as Base Material; P. Sahoo , R. Murmu , S. Patra , C. Dutta and **H. Sutar** ; *Materials Sciences and Applications*, **9(10)**, 837-843, 2018.
- [6] Strain Rate Effects on Tensile Properties of HDPE-PP Composite Prepared by Extrusion and Injection Moulding Method; **H. Sutar**, H. S Maharana, C. Dutta, R. Murmu and S. Patra; *Materials Sciences and Applications*, **10(3)**, 205-215, 2019.
- [7] High Density Polyethylene (HDPE) and Polypropylene (PP) Polyblend: An Experimental Approach; **H. Sutar**, R. Murmu, C. Dutta; *New Advances in Materials Science and Engineering*, Vol-1, Chapter-4, 40-65, 2019(**BOOK CHAPTER**).
- [8] A Novel SPEEK-PVA-TiO₂ Proton Conducting Composite Membrane for PEMFC Operations at Elevated Temperature; R Murmu, **H. Sutar**; *Journal of Polymer Materials*, **35(4)**, 409-431, 2018.
- [9] Steady State Analysis of Water Transport through Sulfonated Polyether Ether Ketone (SPEEK) Membrane for Fuel Cell Application; R Murmu, **H. Sutar**; *Journal of Polymer Materials*, **35(1)**, 103-118, 2018.
- [10] Synthesis and Characterisation of PVA/PVOH Based Super Porous Hydrogel; S.K Barik, **H. Sutar**, S.C Mishra; *American Chemical Science Journal*, **10(3)**, 1-7, 2015.
- [11] Mixing and Segregation Characteristics of Binary Granular Material in Tapered Fluidized Bed: A CFD Study; **H. Sutar** and C.K Das, *Engineering*, **4(4)**, 215-227, 2012.
- [12] Bio-Detoxification Treatment of Waste Water Containing Cadmium: C.K Das and **H. Sutar**; *IACSIT International Journal of Engineering and Technology*, **4(1)**, 72-75, 2012.

- [13] Effect of Distributor-Orifice on Drying Kinetics in a Fluidized Bed Drier (EDODKFBD), **H. Sutar** and A. Sahoo, *International Journal of Chemical Engineering and Applications*, **2(5)**, 346-351, 2011.
- [14] The effect of distributor design on hydrodynamics of conical fluidized bed dryer; **H. Sutar** and V Kumar. *International Journal of Current Research*, **4(9)**, 168-172, 2012.
- [15] A Review on: Bioremediation, **H. Sutar** and C K Das; *International Journal of Research in Chemistry and Environment*, **2(1)**, 13-21, 2012.
- [16] Hydrodynamic Behaviour of Common Salt Water (NaCl Solution) in a Glass-beads Packed Cylindrical Fluidized Bed; **H. Sutar**, K. Barik, A.K Bairagi and R Murmu; *American Chemical Science Journal*, **9(2)**, 1-6, 2015.
- [17] Effect of Red Mud (RM) Reinforcement on Physio-Chemical Characteristics of Ordinary Portland Slag Cement (OPSC) Mortar; **H. Sutar**, R. Murmu, D. Roy, S.C Mishra and A. Mishra; *Advances in Materials Physics and Chemistry*, **6(8)**, 231-238, 2016.
- [18] Experimental Investigation and Process Optimization of Biodiesel Production from Kusum Oil Using Taguchi Method; R. Murmu, **H. Sutar**, S. Patra; *Advances in Chemical Engineering and Science*, **7(4)**, 464-476, 2017.
- [19] Wear behavior of Al-Si alloy based metal matrix composite reinforced with TiB₂; J.K Sahoo, S.K Sahoo, **H. Sutar**, B. Sarangi; *IOP Conference Series: Materials Science and Engineering*, **178(1)**, 012025, 2017.
- [20] Unsteady State Heat Transfer in Externally Heated Magnesio Thermic Reduction Reactor: An overview; **H. Sutar** and A Sahoo, *International Conference on Chemistry and Chemical Process*, **210-214**, 2011. IACSIT Press, Singapore.
- [21] The Discrepancy in the Prediction of Surface Temperatures by Inverse Heat Conduction Models for Different Quenching Processes from Very High Initial Surface Temperature; A.R Patil, N.H. Bhatt, L. Das, S. Teja, S. Nayak, A. Kumar, A. Sahoo, B. Munshi, A. Behera, **H. Sutar**, S.S Mohapatra; *Inverse Problems in Science and Engineering*, **27(6)**, 808-835, 2018.
- [22] Dry Sliding Wear Behavior of Aluminium Matrix Composite Using Red Mud an Industrial Waste; N. Prasad, **H. Sutar**, S. C Mishra, S. K Sahoo, S. K

Acharya; *International Research Journal of Pure and Applied Chemistry*, 3(1), 59-74, 2013.

- [23] Computational Simulation of Unsteady State Heat Transfer in Externally Heated Magnesium Thermic Reduction Reactor: An overview (CSUHEMTRR); H. Sutar and A. Sahoo; *International Journal of Chemical Engineering and Applications*, 2(3), 212-215, 2011.

Reviewer of Following Journals:

- [1] Tribology in Industry.
- [2] Nuclear Engineering and Technology (Elsevier)
- [3] SN Applied Sciences (Springer)
- [4] Polymers and Polymer Composites (SAGE)
- [5] Chemical Science International Journal (SDI).
- [6] Physical Science International Journal (SDI).
- [7] Current Journal of Applied Science and Technology (SDI).
- [8] Journal of Scientific Research and Reports (SDI).
- [9] Asian Journal of Biotechnology and Bio-resource Technology (SDI).
- [10] Advances in Research (SDI).
- [11] Journal of Basic and Applied Research International (IKP).
- [12] Natural Science (Scirp).
- [13] Materials Sciences and Applications (Scirp).
- [14] Environmental Engineering and Management Journal.
- [15] Asian Journal of Chemical Sciences (SDI)
- [16] Journal of Materials Science Research and reviews (SDI)
- [17] Journal of Engineering Research and Reports (SDI)

Editorial board member:

Journals

- [1] Journal of Engineering Research and Reports
(SCIENCEDOMAIN International Publisher)
- [2] Chemical Science International Journal
(SCIENCEDOMAIN International Publisher)

Books

1. Current Perspectives on Chemical Sciences, Vol-02.
2. Current Research and Development in Chemistry, Vol-1.

Master's Thesis Supervision:

- [1] *Prakash Chandra Sahoo*, Mechanical Strength of HDPE/PP Polyblends with HDPE as Matrix, **2018**.
- [2] *Surajabala Sahoo*, Surface Morphology, Crystallization Behavior and Electrical Properties of PP Reinforced HDPE Composite, **2018**.
- [3] *Prateekshya Suman Sahu*, Thermal and Phase Analysis of HDPE and PP Polyblend, **2018**.
- [4] *Sarat Chandra Patra*, Preparation, Characterisation and engineering applications of Multiwalled Carbon Nanotube(MWCNTs)-PP Nano composite. **2020**
- [5] *Dibyani Sahu*, Effect of size and surface area of Graphene Nano Platelets (GNPs) on Physio-chemical properties GNPs-Bioplastic Nano composite. **[Ongoing]**

Funded Project:

1. How is the graphene/polypropylene Nanocomposites overall performance affected by Nanofiller thickness?
Funded by: TEQIP-III, Amount:1.05 Lakh.
2. Study of Physiochemical Properties of MWCNT/Bio-Plastic Nanocomposites.
Funded by: TEQIP-III, Amount:3 Lakh

Subjects Teach:

1. Mass Transfer-I
2. Mass Transfer-II
3. Fluid mechanics
4. Advanced Mass Transfer
5. Mechanical Operation
6. Chemical Reaction Engineering
7. Heat Transfer

Achievements :

1. Qualified GATE 2007, **All India RANK-675**, Chemical Engineering.
2. Selected as Assistant Engineer, HAL, Engine Division, Odisha, 2005.
3. Selected as Trainee Scientific Officer, NPCIL, 2007.
4. Among top 5 in UG at IGIT Sarang, 2005.
5. Topper in diploma engineering study at UGIE, Rourkela, 2001.

Google scholar:

ID: 5aT1HesAAAAJ

<https://scholar.google.co.in/citations?user=5aT1HesAAAAJ&hl=en>

Total citations: 329, h-index-8, i10- index-7

Publons :

ID: 1219719, <https://publons.com/a/1219719/>

Total Manuscripts Reviewed -33

Manuscript Handled as Editor-15

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References :

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2. Dr Saroj Sundar Baral
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