Curriculum Vitae

Raj Kumar Das

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PROFESSIONAL EXPERIENCE:

06.08.2018- 15.05.2019	Guest Faculty Chemical Engineering Department NIT Arunachal Pradesh, India

ACADEMIC QUALIFICATIONS:

2004-2008	B.E. (Chemical Engineering) Jadavpur University, Kolkata, India (B Tech Project: Waste water treatment by primary treatment method)
2010-2012	M Tech (Chemical Engineering) IIT Kharagpur, W.B., India (Master's Project: Study of biogas production from solid wastes)
2012-2018	Doctor of Philosophy in Chemical Engineering PhD title: ***Bio-inspired synthesis of Co_3O_4 and NiO nanoparticles for electrocatalytic H_2O_2 generation and sensing*** Chemical Engineering Department, IIT Guwahati, India Funding Agency: DST, Project cost: 26.2 lakhs, **Duration:** 24.05.13-24.05.17

RESEARCH SUMMARY

Specialization:

- Green synthesis of Nanoparticles,
- Sensor development,
- Electro-cataltyic H_2O_2 formation and H_2O_2 sensing,
- Wastewater Treatment (Drug removal by AOPs).

Thesis overview:

Aims: The following objectives of the doctoral work are designed.

✓ Electrocatalytic H_2O_2 generation in an undivided electrolyser

- To elucidate the effect of transition and alkaline metal ions, solution pH, and

temperature on the stability of H_2O_2

- To study on electrogeneration of H_2O_2 at isomoulded graphite cathode in an undivided cell and to optimize the process parameters to understand their effects on H_2O_2 formation and decomposition at Ti/TiO_2 anode
- To develop a bio-mediated technique using the analytes present in S. edule for the synthesis of Co_3O_4 and NiO NPs and to determine their physiochemical attributes
- To fabricate modified graphite electrodes to investigate the electrocatalytic activity of Co_3O_4 and NiO NPs for an enhanced H_2O_2 generation
- To investigate on the utilization of electrogenerated H_2O_2 for the treatment of PhACs wastewater

✓ Electrocatalytic H_2O_2 sensing on graphite support electrode

- To fabricate modified graphite electrodes for Co_3O_4 and NiO NPs catalysed H_2O_2 sensing in a phosphate buffer media
- To derive the fundamental electrochemical parameters and to explore the catalytic action of Co_3O_4 and NiO NPs for H_2O_2 sensing
- To analyse real H_2O_2 samples and to compare with the titanic sulphate spectrophotometric technique
- To explore the effects of common electro-active species interfering with the H_2O_2 sensing

PUBLICATIONS

1. **R. K. Das** and A. K. Golder, Dual Catalytic Activity of NiO NPs in H_2O_2 Sensing and its Formation for the Decomposition of Ciprofloxacin (**communicated**).
2. **R. K. Das** and A. K. Golder, Mechanism of Ciprofloxacin decay using electro-generated H_2O_2 via. Co_3O_4 NPs fabricated electrode (**communicated**).
3. **R. K. Das** and A. K. Golder, Co_3O_4 spinel nanoparticles decorated graphite electrode: Bio-mediated synthesis and electrochemical H_2O_2 sensing, ***Electrochimica Acta, 2017,*** *251, 415-426* (Elsevier).
4. **R. K. Das** and A. K. Golder, Use of plant based analytes for the synthesis of NiO nanoparticles in catalyzing electrochemical H_2O_2 production, ***J. Electroanal. Chem.*** **2018,** 823, 9-19 (Elsevier).
5. **R. K. Das** and A. K. Golder, Impact of supporting electrolytes on the stability of Ti/TiO_2 counter electrode during H_2O_2 electrogeneration, ***Surf. Eng. Appl. Electrochem. 2017,*** *53, 570-579* (Sringer).
6. **R. K. Das**, S. Saha, Ch.V. Rao and A. K. Golder, Bio-inspired AgNPs, multilayers reduced graphene oxide and graphite nanocomposite for electrochemical H_2O_2 sensing, ***Bull. Mater. Sci.*** **2018**, *41 (86) 1-11* (Sringer).
7. **R. K. Das**, A. S. Giri, and A. K. Golder, Role of supporting electrolytes for hydrogen peroxide generation on graphite cathode, ***Internat. J. Cur. Eng. Sci. Res. 2014,*** *1(4), 31-34 (TRO India).*

8. V. Rani, **R. K. Das** and A. K. Golder, Fabrication of graphene-graphite paste electrode for H_2O_2 formation and its implication for ciprofloxacin degradation**,** ***Surf. Interf.*** **2017, 7, 99-105** (Elsevier).
9. S. Chakraborty, Ch.V. Rao, **R.K. Das**, A.S. Giri, A.K. Golder, 2016, Bio-mediated silver nanoparticle synthesis: mechanism and microbial inactivation, ***Toxicol. Environ. Chem.*** **2017,** 99, 434-447 (Taylor & Francis).
10. M. Malika, Ch V. Rao, **R.K. Das**, A.S. Giri and A.K. Golder, Evaluation of bimetal doped TiO_2 in dye fragmentation and its comparison to mono-metal doped and bare catalyst, ***Appl. Surf. Sci.*** **2016**, 368, 316–324 (Elsevier).
11. A. K. Behera, Ch V. Rao, **R.K. Das**, A.S. Giri and A.K. Golder, Fabrication and characterization of ag-doped titania: Impact of dye-sensitization, phenol decomposition kinetics and biodegradability index, ***Desalin. Water Treat.*** **2016**, 57 (20), 9488-9497 (Elsevier).

CONFERENCE/SEMINER AND WORKSHOP

International Conferences

1. **R. K. Das** and **A.** K. Golder, Hydrogen peroxide electro-generation at different supporting electrolytes using graphite both as working and counter electrodes with Ag/AgCl reference, CHEMCON-2015, December 27-30, 2015, Indian Institute of Technology, Guwahati, India.
2. **R. K. Das**, V. Rani and **A.** K. Golder, Two electron transfer hydrogen peroxide generation using high purity (99.95%) isomolded graphite cathode, International Conference on Water:From Pollution to Purification (ICW-2015), January 23-26, 2015, Centre for Environment Education and Technology (CEET), Kottayam, India.
3. **R. K. Das**, A. S. Giri, and A. K. Golder, Role of supporting electrolytes for hydrogen peroxide generation on graphite cathode, International Conference on Civil and Chemical Engineering (ICCCE-2014), 30 November, 2014, Warangal, India.
4. **R. K. Das** and A. K. Golder, Stability of aqueous H_2O_2 at elevated temperature and pH in presence of common cations, CHEMCON-2013, December 27-30, 2013, Institute of Chemical Technology, Matunga, Mumbai, India.
5. Ch. V. Rao, **R.K. Das**, S. R. Das, P. Ghosh, S. Saha and A. K. Golder, "A bio-mediated route of AgNPs synthesis and photocatalyst activation." IITG-KIT Joint Symposium on Soft and Biobased Materials, August 2016, Kyoto Institute of Technology, Kyoto, Japan.
6. Ch. V. Rao, **R.K. Das**, S. R. Das, P. Ghosh, S. Saha and A. K. Golder, "A biological route of AgNPs synthesis: Size control and functionality." Biotechnology, Biomaterials and Renewable Energy, August 2016, GIFU University, GIFU, Japan.

National Conferences

1. **R.K. Das** and A.K. Golder, Enhanced H_2O_2 electro-generation at metal catalyzed graphene-graphite cathode, March 25- March 27 (Reflux 2016), Indian Institute of Technology Guwahati, India.
2. **R.K. Das** and A.K. Golder, Synergistic effect of formation of H_2O_2 at cathode and OH^o(ad) at anode on decontamination studies- A review, Annual Chemical Engineering Symposium, March 29- March 30 (Reflux 2014), Indian Institute of Technology Guwahati, India.
3. **R.K. Das** and A.K. Golder, Synergistic effect of supporting electrolytes on H_2O_2 formation using graphite both as working and counter electrodes with Ag/AgCl reference electrode, June

4-6 June (National conference Challenges in Environmental Research, 2015), Indian Institute of Technology Guwahati, India.

Institute conference

1. R.K. Das, V. Rani and **A. K. Golder**, Different type of the anode used affect hydrogen peroxide generation with various supporting electrolyte in undivided cell. March 23-26, 2015, **Students' Academic Board (SAB) PhD Council, IIT Guwahati, India**.

Workshop

1. National workshop on Technical writing conducted under the technical education quality improvement programme sponsored by the Ministry of Human Resource Development, Government of India, held on 6-7 December'2014.

LEADERSHIP QUALITY

2013 **QIP Short Term Course volunteer**: Advanced Chemical Process Design, July 8-12, 2013, Department of Chemical Engineering, Indian Institute of Technology Guwahati, India (Coordinator: Dr. A. K. Golder and Prof. R.G. Uppaluri).

2015 **Coordinator for room accommodation:** CHEMCON 2015, 68th Annual session of Indian Institute of Chemical Engineers, December 27-30, 2015, IIT Guwahati, Assam.

Research Interest

- Wastewater Treatment (AOP)
- Energy and Fuel cells
- Nanotechnology (Green synthesis of nanoparticles)
- Electrochemistry
- Sensor development

Subject Taught in NIT Arunachal Pradesh

- Process Control
- Engineering Thermodynamics
- Fluid Mechanics
- Nanotechnology
- Nuclear Energy

Permanent Address

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DECALARATION

I do hereby declare that the above mentioned particulars are true to the best of my knowledge.

Raj Kumar Das