

## Dr. Biju Mani Rajbongshi

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### Objectives

*To strive for continuous knowledge assimilation for enhancing my professional standards that is necessary to perform my duties with lot of zeal and endeavour.*

### Academic Qualifications

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Ph.D in Energy Technology	Tezpur university, Assam, in 2016
	Thesis title: <i>Synthesis, characterization and engineering of novel visible active metal oxide photoactive material for solar photocatalysis application</i>
M. Tech in Energy Technology	Tezpur university, Assam, in 2011 (CGPE: 8.08/10.00)
M.Sc in Physics	Gauhati University, Assam, in 2008, (63.65%)
B.Sc in Physics	Pub Kamrup college, Gauhati University, Assam, in 2006 (59.22%)

### Professional Experience

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1. Research Associate, Department of Chemical Engineering, Indian Institute of Technology Delhi, New Delhi, February, 2019-till today
2. National Postdoctoral fellow, Department of Chemical Engineering, Indian Institute of Technology Delhi, New Delhi, February 2017- February 2019
3. Guest faculty, Department of Energy Engineering, North Easter Hill University, Shillong, Meghalaya, *March 2015 –July 2016*
4. Teaching Assistantships, Department of Energy, Tezpur University, Tezpur, Assam, *January 2012-July 2012.*

## Research Area of Interest

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- Solar Energy Utilization: *solar photovoltaic, solar photocatalysis and solar thermal*
- Fuel cell and hydrogen energy
- CO<sub>2</sub> conversion to fuel
- Advance energy material

## Research Experience

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Postdoctoral Research-I: Cold start PEM fuel cell

- Performance analysis of PEM fuel cell at subzero temperature

Postdoctoral Research-II: Plasmonic mixed phase TiO<sub>2</sub> bases Dye Sensitized Solar Cell

- Synthesis of plasmonic mixed phase TiO<sub>2</sub> photoelectrode
- Synthesis of superstructure mixed phase TiO<sub>2</sub> photoanode
- Fabrication of Dye sensitized solar cell

Doctoral Research: Visible active metal oxide solar photocatalyst

- Synthesis and application of TiO<sub>2</sub> and ZnO based visible active photocatalyst
- Synthesis and application of mixed phase ZnO photocatalyst
- Synthesis of TiO<sub>2</sub>-ZnO nano-composite based dye sensitized solar cell

## Book Chapters

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- **Biju Mani Rajbongshi** and Anil Verma “Emerging Nanotechnology for third Generation Photovoltaic cells”, In: Nanotechnology: Applications in Energy, Drug and Food, Ed., Dr. Melvin Gan Jet Hong, Springer, ISBN: 978-3-319-99601-1.
- **Biju Mani Rajbongshi**, Photocatalyst: Mechanism, challenges and strategy for organic contamination degradation, Elsevier , ISBN 978-0-12-819049-4.

## SCI Journal publications (Total Impact Factor>50)

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1. Barnali Das, Ranjith G. Nair, **Biju Mani Rajbongshi** and S.K. Samdarshi, "Investigation of the photoactivity of pristine and mixed phase N-doped Titania under visible and solar irradiation" **Material characterization**, **83**, 145-151, 2013 (**Impact factor:3.5**).
2. **Biju Mani Rajbongshi** and S K Samdarshi "Cobalt-doped zincblende–wurtzite mixed-phase ZnO photocatalyst nanoparticles with high activity in visible spectrum" **Applied Catalysis B: Environmental**, **144**, 435-441, 2014 (**Impact factor: 16.68**)  
<https://doi.org/10.1016/j.apcatb.2013.07.048>
3. **Biju Mani Rajbongshi** and S. K. Samdarshi "ZnO and Co-ZnO nanorods - Complementary role of oxygen vacancy in photocatalytic activity of under UV and visible radiation flux" **Materials Science and Engineering: B**, **182**, 21-28, 2014 (**Impact factor: 4.7**).
4. **Biju Mani Rajbongshi**, Anjalu Ramchiary and S. K. Samdarshi "Synthesis and characterization of plasmonic visible active Ag/ZnO photocatalyst" **Journal of material science: Material in Electronics**, **25**, 2969–2973, 2014 (**Impact factor: 2.2**).
5. **Biju Mani Rajbongshi**, Anjalu Ramchiary, S. K. Samdarshi "Influence of N-doping on photocatalytic activity of ZnO nanoparticles under visible light irradiation" **Materials Letters**, **134**, 111-114, 2014 (**Impact factor: 3.2**).
6. **Biju Mani Rajbongshi**, Anjalu Ramchiary, and S. K. Samdarshi "Investigation of visible light active Ag sensitized mixed phase TiO<sub>2</sub> photocatalyst for solar energy application" **Journal of Sol-Gel Science and Technology**, **72**, 114–121, 2014 (**Impact factor- 2.0**).
7. **Biju Mani Rajbongshi**, S. K. Samdarshi, Bibha Boro, Multiphasic bi-component TiO<sub>2</sub>–ZnO nanocomposite: synthesis, characterization and investigation of photocatalytic activity under different wavelengths of light irradiation, **Journal of material science: Material in Electronics**, **26**, 377–384, 2015 (**Impact factor: 2.2**).

8. Bibha Boro, **Biju Mani Rajbongshi**, S. K. Samdarshi, “Synthesis and fabrication of TiO<sub>2</sub>-ZnO nanocomposite based solid state dye sensitized solar cell” **Journal of Material Science: Material in Electronics**, 27, 9929–9940, 2016 (**Impact factor: 2.2**)
9. Samrat Paul, **Biju Mani Rajbongshi**, Birinchi Bora, Ranjith G Nair and S K Samdarshi “Organic photovoltaic cells using green-MWCNTs” **New Carbon Materials**, 32, 27-34, 2017 (**Impact factor: 0.90**)
10. Ranjith G. Nair, Abinash Das, Samrat Paul, **B. M. Rajbongshi**, S.K.Samdarshi, “MWCNT decorated V-doped titania: An efficient visible active photocatalyst” **Journal of Alloys and Compounds**, 695, 3511-3516, 2017 (**Impact factor: 4.6**)
11. Bibha Boro, B. Gogoi, **B.M. Rajbongshi**, A. Ramchiary, Nano-structured TiO<sub>2</sub>/ZnO nanocomposite for dye-sensitized solar cells application: A review, **Renewable & Sustainable Energy Reviews**, 81, 2264-2270, 2018 (**Impact factor: 12.11**)
12. **Biju Mani Rajbongshi**, Anil Verma, Plasmonic noble metal coupled biphasic TiO<sub>2</sub> electrode for dye-sensitized solar cell, **Materials Letters**, 232, 220-223, 2018 (**Impact factor: 3.2**)
13. Karan Malik, **Biju Mani Rajbongshi**, Anil Verma, Syngas Production from Electrochemical Reduction of CO<sub>2</sub> at High Current Density using ZnO/CuO Nanocomposite, **Journal of CO<sub>2</sub> Utilization**, 33, 311-319, 2019 (**Impact factor: 5.99**)
14. Kumari, N., Gaurav, K., Samdarshi, S.K., A.S.Bhattacharyya, Paul S., **Rajbongshi, B.**, Mohanty, K.. “Dependence of photoactivity of niobium pentoxide (Nb<sub>2</sub>O<sub>5</sub>) on crystalline phase and electrokinetic potential of the hydrocolloid” **Solar Energy Materials and Solar Cells** 208,110408 (**Impact factor: 6.98**)
15. **Biju Mani Rajbongshi**, M. Shaneeth, Anil Verma “Investigation of Sub-zero Start-up of Polymer Electrolyte Membrane Fuel Cell using Un-assisted Cold Start Strategy” **International Journal of Hydrogen energy**, **Impact factor: 4.9**

16. S. Saha, **B. M. Rajbongshi**, V. Ramani, A. Verma, Titanium Carbide: An Emerging Electrocatalyst for Fuel Cell and Electrolyser, **International Journal of Hydrogen energy**, **Impact factor: 4.9**

#### **CONFERENCE PAPER**

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1. **Biju Mani Rajbongshi**, Samrat Paul and S. K. Samdarshi; “A review on polyaniline in organic solar cell” **International congress on Renewable energy 2010**, Chandigarh.
2. **Biju Mani Rajbongshi**, Samrat Paul and S. K. Samdarshi; “Green Synthesis of polyaniline nanoparticles” **National conference of smart nanostructures 2011**, Tezpur University,
3. **Biju Mani Rajbongshi**, Samrat Paul and S. K. Samdarshi; “Synthesis of carbon nanotube from Mustard oil” **Indian Science Congress Association 2011**, SRM Chennai.
4. **Biju Mani Rajbongshi**, Bibha Boro, and S K Samdarshi, “Synthesis and Characterization of Ti-Zn oxide composite photocatalyst” **International seminar and workshop on Energy, sustainability and development**, 2012, Sivsagar, Assam.
5. Bibha Boro, **Biju Mani Rajbongshi** and S.K. Samdarshi; “A review of Solid State Dye Sensitized Solar Cells” **International congress on Renewable energy, 2012**, Tezpur University.
6. **Biju Mani Rajbongshi**, Anjalu Ramchiary and S. K. Samdarshi, “Surface plasmon assisted visible active Ag/ZnO photocatalyst” **International Conference on Nanotechnology 2013**, Kolkata.
7. **Biju Mani Rajbongshi**, Anjalu Ramchiary, S.K. Samdarshi “Synthesis and characterization of visible active nitrogen doped ZnO” **International conference on green energy and smart material through science, technology and management (GESM14) 2014**, Guwahati.

8. Anjalu Ramchiary, **Biju Mani Rajbongshi**, S.K. Samdarshi “Investigation of the photo catalytic Performance of Fe- doped  $\text{TiO}_2$  photo catalyst under visible light for solar energy utilization” **International conference on green energy and smart material through science, technology and management (GESM14)** 2014, Guwahati, India.
9. **Biju Mani Rajbongshi**, Samrat Paul, Influences of Fe doping concentration on the structural, optical and photocatalytic properties of  $\text{TiO}_2$  nanoparticles” **1st Springer International Conference on Emerging Trends and Advances in Electrical Engineering and Renewable Energy**, 2016, Sikkim, India.
10. **Biju Mani Rajbongshi** and Anil Verma “Synthesis and solar photocatalytic activity of Co-ZnO nanoparticles” **OPEN HOUSE 2017, IIT Delhi**.
11. **Biju Mani Rajbongshi**, Priyank Rajput and Anil Verma “Photocatalytic degradation of model textile dye in waste water using Fe doped  $\text{TiO}_2$  photocatalyst” **Industry Day 2017, IIT Delhi**
12. **Biju Mani Rajbongshi**, Karan Malik and Anil Verma “Mixed phase Ag- $\text{TiO}_2$  nano-composite for electrochemical hydrogen evolution” **ICEAR 2017, IIT Bombay**.
13. **Biju Mani Rajbongshi**, Priyank Rajput and Anil Verma “Synthesis and characterization of Cu loaded mixed phase  $\text{TiO}_2$  nanoparticles” **ICEAR 2017, IIT Bombay**.
14. **Biju Mani Rajbongshi**, Priyank Rajput and Anil Verma “Facile synthesis and characterization of mixed phase  $\text{TiO}_2$  nanorod” **OPEN HOUSE 2018, IIT Delhi**.
15. Karan Malik, **Biju M. Rajbongshi**, Jay Pandey, Anil Verma, “Ni-Mn based Bimetallic Electro-catalyst for Electrochemical Reduction  $\text{CO}_2$  to Hydrocarbons” **Chemcon 2018**
16. **Biju Mani Rajbongshi**, Anil Verma “ Investigation of sub-zero temperature on polymer electrolyte membrane fuel cell” **Chemcon 2019**

## **WORKSHOP AND SYMPOSIUM**

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1. ISTE Workshop on “**Solar Photovoltaics: Fundamentals, Technologies and Application**” conducted by **IIT Bombay**, from 12-22 December 2011.
2. **Workshop on spectroscopic tools and their applications**, Conducted by Department of chemical sciences, **Tezpur University**, Tezpur, Assam.
3. **Indo-Finnish symposium on “Role of catalyst on production of green fuel”** Department of Energy, Tezpur University. **2013**
4. **Indo-Finnish workshop on green chemistry**, Department of Energy, Tezpur University, 13-14 December 2013.
5. **“Functioning and maintenance of solar radiation resource assessment station”** Training program by Centre for Wind Energy Technology, Chennai & Tezpur University, 2014.
6. **“2-day Familiarization workshop on nanofabrication technologies”** Tezpur University, April 25-26, 2015.

## **Scientific Skills**

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1. Nano-material synthesis
  - Hydrothermal synthesis, Co-precipitation, Sol-gel technique, Electro-deposition
2. Thin film preparation
  - Dip coating, spin coating, solution casting, Spray coating
3. Solar cell fabrication
  - Dye sensitized solar cell
  - Organic solar cell
4. Electro catalytic CO<sub>2</sub> reduction
  - Liquid phase CO<sub>2</sub> reduction to CO
5. Instrumentation techniques
  - Structural characterization: X-ray Diffraction (XRD), Fourier transform infrared spectroscopy (FT-IR), Raman spectroscopy, X-ray photoelectron spectroscopy (XPS)
  - Physical characterization: Pore size distribution (BET-BJH) isotherms, Atomic force microscopy (AFM), Particle size analyser (PSA)

- Chemical characterization: Gas chromatography (GC)
- Optical characterization : UV-VIS Spectrophotometer, Photoluminescence spectroscopy
- Morphological characterization: Scanning electron microscopy-energy dispersive X-ray (SEM-EDX), Transmission electron microscopy (TEM)
- Stability Test: Thermal gravimetric analysis/differential scanning calorimetry (TGA/DSC)
- Electrochemical characterization: Cyclic voltametry (CV), Linear sweep voltammetry (LSV), Electrochemical impedance spectroscopy (EIS), Chronopotentiometry chronoamperimetry,

### **Courses Taught**

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1. Alternative fuel for IC engine, (PG level, *credits 3*)
2. Basic of Solar Energy Engineering, (UG level, *credits 4*)
3. Solar Energy Laboratory, (UG level, *credits 3*)
4. Nuclear Energy, (UG level, *credits 3*)
5. Biomass and Bio-fuel laboratory, (UG level, *credits 3*)
6. Internal Combustion Engine laboratory, (UG level,, *credits 3*)
7. Fuel and combustion laboratory, (UG level, *credits 3*)
8. Heat and Mass Transfer Laboratory, (UG level, *credits 3*)

### **Reviewer of Journal**

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- Journal of material science: Material in electronics (Springer)
- Journal of Materials Science
- Indian Chemical Engineer
- Supper lattice and microstructure

### **Sponsored Projects**

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“Noble metal loaded TiO<sub>2</sub> based plasmonic nanostructures for dye sensitized solar cell” sponsored by Science and Engineering Research Board, DST India (Sanction No: PDF/2016/002109; Sanctioned Amount: Rs. 19.20 Lakh). Role: PI.

### **Academic Achievements**

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1. CSIR-SRF, 2014
2. DST-SERB, NPDF, 2017



3. First prize, Chemical Engineering Department, OPEN HOUSE IIT Delhi, 2017

### Personal Details

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1. Permanent Address	: C/O Late Narayan Rajbongshi, Vill- Borphukan Khat, P.O. Goreswar, Kamrup (Baksha)-781366, Assam, India
2. Date of Birth	: May 31, 1984.
3. Sex	: Female
4. Marital Status	: Married
5. Language known	: Assamese, English, Hindi
6. Nationality	: Indian
7. State of Domicile	: Assam
8. Religion	: Hindu
9. Category	: OBC (Non creamy layer)

### REFERENCES

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#### 1. Prof. S. K. Samdarshi

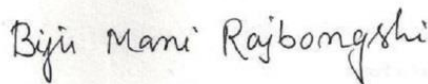
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#### 2. Prof. Rupam Kataki,

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Tezpur University, Tezpur, Assam  
Email: rupamkataki@gmail.com

### Declaration

I hereby declare that all the above mentioned information is true to the best of my knowledge.



Place: New Delhi

(BIJU MANI RAJBONGSHI)