

Ajinkya K. Ranade, D. Eng.

Senior Technology Scientist | Sustainable Water Treatment

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Thane, India.



SUMMARY

Former JSPS Postdoctoral Fellow with a strong record of high-impact, interdisciplinary research in optoelectronics and water treatment, focusing on emerging contaminant remediation. Expertise in chemistry, 2D materials engineering, semiconductor interfaces, photo-bioelectrochemistry and sustainable water-treatment technologies. Published influential studies on charge-transfer dynamics across inorganic (2D/3D heterojunctions) and biohybrid (photocatalyst-2D material-microbe) interfaces. At Inphlox Water Pvt. Ltd., developed and implemented electrochemical water treatment technologies at commercial scale: identified and optimized key operational parameters limiting the efficiency of electrocoagulation-based processes; designed and developed an electrochemical reactor for sustainable treatment of various wastewater streams at pilot and industrial scales; patent application to be filed. Possesses strong academic, collaborative, and problem-solving skills, with a long-term goal of establishing a "Sustainable and Synergic Materials Interface Lab" dedicated to developing fit-for-purpose, scalable, energy-efficient fourth-stage wastewater treatment technologies, advancing the water-energy nexus, and training the next generation of researchers.

EXPERIENCE

Senior Technology Scientist

Inphlox Water Pvt. Ltd.

08/2025 Thane, India

The company develops and implements electrochemical water treatment technologies at commercial scale.

- Identified and optimized key operational parameters limiting the efficiency of electrocoagulation-based water treatment processes.
- Designed and developed an electrochemical reactor for the sustainable treatment of various wastewater streams.
- Patent application in process.

JSPS Postdoctoral fellow

School of Environment & Society, Tokyo Institute of Technology

06/2023 - 06/2025 Tokyo, Japan

Led research project for developing sustainable and synergic water treatment technology for emerging contaminant remediation

- Published fundamental mechanism governing intimately coupled photocatalytic biodegradation (ICPB) in the prestigious *Water Research* journal
- Achieved complete degradation of antibiotic pollutant with **9 & 13 times faster kinetic rate constant** than photocatalysis and biodegradation techniques.
- Reduced electrical energy per order by 90%** than photocatalysis technique

IOE-IISc Postdoctoral fellow

Centre for Sustainable Technologies, Indian Institute of Science, Bangalore.

04/2022 - 03/2023 Bengaluru, India

Led research project for developing sustainable technology for organic micropollutant remediation

- Developed **graphene based composites** for visible light induced photocatalysis degradation of antibiotic pollutant
- Developed **working protocol** for intimately coupled photocatalytic biodegradation water treatment technique
- Established inter and intra departmental collaboration

STRENGTHS



Technical expertise

Successfully developed individual and synergic water treatment techniques for enhanced degradation of emerging contaminants.



Interdisciplinary Research

Successfully integrated chemistry, materials engineering, graphene technology, photocatalysis and bio-electrochemistry towards developing sustainable water treatment technology.

SKILLS

Chemistry lab techniques

Water treatment technologies

Interdisciplinary research

Collaboration

Project development

Technical Presentations

Communication

Academic writing

Leadership

Teamwork

Mentoring

RESEARCH GRANTS

JSPS International Postdoctoral grant (2023-2025)

School of Environment and Society, Institute of Science Tokyo (Formerly known as Tokyo Institute of Technology). Tokyo, Japan.

Project Title: Graphene-induced charge separation for enhancing intimately coupled photocatalytic biodegradation.

(Research grant – 2 million JPY)

IOE-IISc Postdoctoral fellowship

SusPaani Lab, Centre for Sustainable Technologies, Indian Institute of Science Bangalore, India.

Project Title: Multifunctional biocarrier-based intimately coupled photocatalytic biodegradation (ICPB) for enhanced degradation of organic micropollutants.

(Research grant – 2 Lacks INR)

EXPERIENCE

Technical Support and Application Specialist

Mettler Toledo Pvt. Ltd.

📅 10/2021 - 03/2022 📍 Mumbai, India

Technical support for electrochemical analytical instruments to Japan region

- Developed a 3D printed accessory of autosampler instrument for Japanese pharmaceutical client

Junior Research Fellow

Walchand Centre for Research in Nanotechnology and Bionanotechnology

📅 02/2016 - 11/2017 📍 Solapur, India

Nanotechnology Research Centre

- Developed green-adsorbents from agro-waste derived carbon materials for treatment of locally generated textile industry wastewater.
- Independently taught M.Sc. Nanotechnology course work including lectures and practicals.

R & D coordinator

Hindustan Unilever Ltd.

📅 09/2015 - 01/2016 📍 Mumbai, India

- Analyzed and developed reports on commercial air-purifier units.

EDUCATION

Doctor of Engineering, Department of Physical Sciences and Engineering

Nagoya Institute of Technology, Japan.

📅 04/2018 - 03/2021 📍 Nagoya, Japan

Master of Science in Analytical Chemistry

R. Ruia College, Mumbai University

📅 06/2013 - 04/2015 📍 Mumbai, India

Bachelor of Science in Chemistry

R. Ruia College, Mumbai University

📅 06/2010 - 04/2013 📍 Mumbai, India

WATER TREATMENT SKILLS

Water treatment:

Sustainable and energy-efficient treatment of emerging contaminants in water matrix using individual techniques i.e. **adsorption**, **photocatalytic degradation**, **biodegradation** and synergic techniques i.e. **intimately coupled photocatalytic biodegradation** (ICPB)

Bioreactor design

Designing bioreactor setup of ICPB technique for decentralized and continuous mode of operation.

Analytical techniques

Chemical analysis: Chemistry based qualitative and quantitative analysis techniques, COD, BOD, total organic carbon (TOC) and high-performance liquid chromatography (HPLC)

Material characterization: UV-VIS-IR spectroscopy with **DRS**, **FTIR** spectroscopy, **Raman** spectroscopy, X-ray diffraction (**XRD**), X-ray photoelectron spectroscopy (**XPS**), scanning electron microscope (**SEM-EDS**), atomic force microscopy (**AFM**), surface area measurement (**BET**), photoluminescence (**PL**) spectroscopy, semiconductor measurement (**I-V characterization**)

Bio-electrochemical analysis

Photo-electrochemical and photo-bio-electrochemical characterization (**LSV**, **EIS**, **chrono-amperometry**) of photocatalysts and photocatalyst/biofilm composites

SELECTED PUBLICATION

Interface dependent electron shunting in graphene-integrated intimately coupled photocatalytic biodegradation

Water Research

Ajinkya Kishor Ranade*, Akira Yamaguchi, Masahiro Miyauchi, Sreenivasan Ramaswami, Chihiro Yoshimura*

📅 01/2025

🔗 <https://doi.org/10.1016/j.watres.2024.123064>

We reported a sustainable, energy-efficient strategy for degrading antibiotic pollutants, demonstrating that photoelectron transfer to the biofilm is a fundamental mechanism governing ICPB and can be controlled by the quality of the photocatalyst-biofilm interface.

Ultraviolet light induced electrical hysteresis effect in graphene-GaN heterojunction

Applied Physics Letters

Ajinkya K. Ranade*, Rakesh D. Mahyavanshi, Pradeep Desai, Masashi Kato, Masaki Tanemura, Golap Kalita*

📅 03/2019 🔗 <https://doi.org/10.1063/1.5084190>

The work was highlighted in renowned scientific websites, i.e., www.graphene-info.com and www.nanowerk.com, which report significant advancements in graphene technology and nanotechnology

1. <https://www.graphene-info.com/understanding-graphenegan-and-other-2d3d-interfaces-uv-illumination-could-be-crucial-next-gen>

2. <https://www.nanowerk.com/nanotechnology-news2/newsid=52924.php>

Formation of effective Y-CuI-GaN heterojunction with excellent ultraviolet photoresponsive photovoltage

Phys. Status Solidi A

Ajinkya K. Ranade*, Pradeep Desai, Rakesh Mahyavanshi, Masaki Tanemura, Golap Kalita*

📅 06/2019 🔗 <https://doi.org/10.1002/pssa.201900200>

MENTORSHIP

Throughout my career, I have been dedicated to mentoring and supervising students, fostering their development in water treatment technologies, materials engineering and carbon nanotechnology.

1. Sakura Science Program (Japanese student exchange program)

📅 01/2021

Nagoya Institute of Technology – Indian Institute of Technology Kharagpur student exchange

2. Sakura Science Program (Japanese student exchange program)

📅 01/2020

Nagoya Institute of Technology – Universiti Putra Malaysia student exchange

ADDITIONAL PUBLICATIONS

Characteristics of vertical Ga₂O₃ Schottky junctions with the interfacial hexagonal boron nitride film

ACS Omega

Rama, Venkata Krishna Rao*, Ranade, Ajinkya, Desai, Pradeep, Todankar, Bhagyashri, Kalita, Golap, Suzuki, Hiroo, Tanemura, Masaki; Hayashi, Yasuhiko*

07/2022 <https://doi.org/10.1021/acsomega.2c00506>

Upcycling the barbeque grease into carbon nanomaterials

Carbon Trends

K.F. Chan*, A.K. Ranade*, P. Desai*, M.A. Hazan*, N.F.I. Azman*, S. Shaharifin*, G. Kalita*, M.S. Mamat*, M. Tanemura*, Y. Yaakob*

12/2021 <https://doi.org/10.1016/j.cartre.2021.100143>

Influence on Electrochemical Reactivity and Synthesis of Stainless Steel/Nitrogen-Doped Carbon Nanofibers

J. Phys. Chem. C

Todankar, B., Desai, P., Ranade, A. K., Yaakob, Y., Asaka, T., Kalita, G., Tanemura

11/2021 <https://doi.org/10.1021/acs.jpcc.1c06234>

Temperature-dependent device properties of γ -CuI and β -Ga₂O₃ heterojunctions

SN Appl. Sci.

Rama Venkata Krishna Rao, Ajinkya K. Ranade, Pradeep Desai, Golap Kalita, Hiroo Suzuki, Yasuhiko Hayashi*

09/2021 <https://doi.org/10.1007/s42452-021-04774-3>

Trifunctional Electrocatalytic Activities of Nitrogen-Doped Graphitic Carbon Nanofibers Synthesized by Chemical Vapor Deposition

Chemistry Select

Bhagyashri Todankar*, Pradeep Desai, Ajinkya K. Ranade, Tharangattu N. Narayanan, Masaki Tanemura, Golap Kalita*

05/2021 <https://doi.org/10.1002/slct.202101068>

Synthesis of MoS₂ Layers on GaN Using Ammonium Tetrathiomolybdate for Heterojunction Device Applications

Crystal Research and Technology

Pradeep Desai*, Bhagyashri Todankar, Ajinkya K. Ranade, Masaharu Kondo, Takehisa Dewa, Masaki Tanemura, Golap Kalita*

01/2020 <https://doi.org/10.1002/crat.202000198>

Ultraviolet radiation-induced photovoltaic action in γ -CuI/ β -Ga₂O₃ heterojunction

Materials Letters

Muhammed Emre Ayhan*, Mandar Shinde, Bhagyashri Todankar, Pradeep Desai, Ajinkya K. Ranade, Masaki Tanemura, Golap Kalita

11/2020 <https://doi.org/10.1016/j.matlet.2019.127074>

Growth of uniform MoS₂ layers on free-standing GaN semiconductor for vertical heterojunction device application

Journal of Materials Science: Materials in Electronics

Pradeep Desai*, Ajinkya K. Ranade, Mandar Shinde, Bhagyashri Todankar, Rakesh D. Mahyavanshi, Masaki Tanemura, Golap Kalita*

02/2020 <https://doi.org/10.1007/s10854-019-02723-w>

MENTORSHIP

3. Mr. Vyankatesh Kudkyaal 2016 - 2017

Institution: Walchand College of Arts and Science, Solapur, India.

Topics: Wastewater purification using carbon-based smart filters. (He won 2nd prize in AAVISHKAR, a state-level student Research competition in Maharashtra, India, for a project conducted under my co-mentorship)

Current position: Ph.D. student at Chubu University, Japan

4. Ms. Su Rui 2024 - 2025

Institution: Institute of Science Tokyo, Japan.

Topics: Material fabrication and characterization, graphene interface engineering, photocatalysis and water treatment technologies (intimately coupled photocatalytic biodegradation)

Current position: MS student at Institute of Science Tokyo, Japan.

5. Ms. Farideh Malekdar, 2024 - 2025

Institution: Institute of Science Tokyo, Japan.

Topics: Material fabrication and characterization, Graphene technology, Photocatalysis.

Current position: Ph.D. student at Institute of Science Tokyo, Japan.

LANGUAGES

English
Proficient



Japanese
Intermediate



Marathi
Native



Hindi
Native



FIND ME ONLINE



Homepage

<https://ajinkya-ranade.github.io/>



LinkedIn

www.linkedin.com/in/ajinkya-ranade-phd-b4b899130



Google Scholar

<https://scholar.google.com/citations?hl=en&user=Yir-Mq8AAAAJ>

ADDITIONAL PUBLICATIONS

Influence of MoS₂-silicon interface states on spectral photoresponse characteristics

Phys. Status Solidi A

Pradeep Desai*, Ajinkya K. Ranade, Rakesh Mahyavanshi, Masaki Tanemura, Golap Kalita*

06/2019 <https://doi.org/10.1002/pssa.201900349>

Observing charge transfer interaction in CuI and MoS₂ heterojunction for photoresponsive device application

ACS Appl. Electron. Mater.

Rakesh D. Mahyavanshi*, Pradeep Desai, Ajinkya Ranade, Masaki Tanemura, Golap Kalita*

02/2019 <https://doi.org/10.1021/acsaem.8b00069>

Photovoltaic action with broadband photoresponsivity in germanium-MoS₂ ultrathin heterojunction

IEEE Transaction on electron devices

Rakesh D. Mahyavanshi*, Golap Kalita*, Ajinkya Ranade, Pradeep Desai, Masaharu Kondo, Takehisa Dewa, Masaki Tanemura

08/2018 [10.1109/TED.2018.2864174](https://doi.org/10.1109/TED.2018.2864174)

Photovoltaic action in graphene-Ga₂O₃ heterojunction with deep-ultraviolet irradiation

Phys. Status Solidi RRL

Golap Kalita*, Rakesh D. Mahyavanshi, Pradeep Desai, Ajinkya K. Ranade, Masaharu Kondo, Takehisa Dewa, Masaki Tanemura

05/2018 <https://doi.org/10.1002/pssr.201800198>

MOTIVATION OF RESEARCH

**"Paani to Paani hai.....Paani Zindagani hai"
Water is everything..... water is life itself.**

-Snippet from a poem by Amol Palekar

REFERENCES

Prof. Chihiro Yoshimura

School of Environment and Society, Institute of Science
Tokyo, Japan

(yoshimura.c.aa@m.titech.ac.jp)

Dr. Sreenivasan Ramaswami

Centre for Sustainable Technology,
Indian Institute of Science, Bengaluru, India (
sreeni@iisc.ac.in)

Dr. Golap Kalita

Principal Researcher,
Nippon Denko Co Ltd, Japan. (golapkalita@gmail.com)