MANPREET KAUR

Green Catalysis Research Group,
Department of Chemical and Petroleum Engineering,
University of Calgary, CANADA

Date of birth: 12 June 1993
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My passion is to serve human well-being and social justice. By working on improving energy conversion efficiency through metal-semiconductor nanostructures, I envision a future where we as humans only depend on renewable energy sources for energy. Outside the lab, I love to travel and to immerse myself in different cultural experiences.

Employment

- **Post Doctorate Research Associate, Department of Chemical and Petroleum Engineering, University of Calgary, Dec 2022- till date.**
  Research focus:
  Electro and Photo catalytic oxidation of methane gas into value liquid products.
  Synthesis of ammonia via utilization of metal-semiconductor hybrid nanostructures.
  Synthesis of efficient solar energy harvesting plasmonic-based nanostructures.
  GC-MS instrument's operation for different volatile components.

- **Post Doctorate Researcher, Regional Centre of Advanced Technologies and Materials (RCPTM), Palacký University, Czech Republic, Jan 2021- May 2022.**
  Research focus:
  Selective catalytic oxidation of organic compounds into useful bio-based polymer.
  Synthesis and utilization of metal-semiconductor hybrid nanostructures for CO_2 reduction and hydrogen generation application.
  Efficient solar energy harvesting with plasmonic-based solar thermal membrane distillation/filtration device.

- **Post Doctorate Researcher, National Institute for Materials Science, Tsukuba, Japan, Oct 2019 -Dec 2020.**
  Research focus:
  Research for an alternative plasmonic materials for energy harvesting application.
  Metallic-semiconductor core-shell structure for photovoltaics, photocatalysis and water splitting applications.
  Utilization of solar energy in water heating/evaporation and electricity production.

- **Junior Researcher, National Institute for Materials Science, Tsukuba, Japan, Oct 2016 -Sept 2019.**
  Research focus:
  Photothermal effect of plasmonic hybrid composite structure for highly efficient sunlight-driven water desalination applications

Degrees:

- **Ph.D. in Condensed Matter Physics, Hokkaido university, Hokkaido Prefecture, JAPAN, Oct 2016-Sept 2019.**
  Research focus:
  Photothermal conversion with plasmonic nanoparticles for water purification
  Photocatalysis using metallic-semiconductor core-shell structure
  Fabrication and optical properties study of metallic (Bi, Ga) nanowires
- **Master of Nanotechnology Engineering (5-year integrated), Sri Guru Granth Sahib World University, INDIA, 2011-2016, CGPA 8.4/10**
  Thesis title: Titanium nitride (TiN) nanoparticles supported by ceramic fibers as a stream generator

Skills:

- GC-MS operator, Electrochemical work station operator.
- **Fabrication.** RF/DC sputtering, atomic layer deposition (ALD), thermal evaporation, chemical vapor deposition, semiconducting/metallic nanoparticles synthesis, metallic nanowires synthesis, photolithography, dry and wet etching, electrochemical anodization, sol gel spin coating, high temperature growth method, 1D and 2D nanomaterials synthesis.
- **Measurement.** HPLC, GC, Ellipsometry, XRD, UV-Visible spectroscopy, Electron paramagnetic resonance spectroscopy, FTIR- Raman spectroscopy, AFM, SEM, EDX, TG/DTA, I-V measurement, Photoluminance spectroscopy.
- **Software Knowledge.** RSOFT and COMSOL simulation software, Layout, Sketch up, Origin.

Recognitions:

- "Young Researcher Presentation Award" **M. Kaur**, at 11th Indian Scientist Association in Japan for "Plasmonic based Core-shell ($TiN/SiO_2/TiO_2$) nanocomposite for eco-friendly water treatment" **6th December 2020**.
- Young Researcher Award, **M. Kaur,** by Japan Society of Vacuum and Surface Science for plasmonic based solar energy harvesting device**, May 2020**.
  https://www.nims.go.jp/mana/news_room/awards/2020103001.html

- Research Funding: For “Fabrication of an efficient seawater desalination system”, **2019** https://academist-cf.com/projects/97?lang=en
- Best oral presentation award, at 9th ISAJ symposium held at AIST, Tsukuba, Japan, **2018** for “All-ceramic Solar Driven water purifier”.
- Excellent poster presentation award, at 10th International MANA Symposium, Japan **2017** for “All-ceramic microfibrous solar steam generator”.
- Low cost and portable solar steam generator were featured in TV Tokyo (TBS) News “*World Business Satellite*” (Broadcasted on 31 May **2019**).
- 2015/5 - 2015/6 NIST Summer Research Internship and Fellowship - 35,000 (Indian rupee), National Institute of Science & Technology, Odisha, INDIA
- 2015/2 - 2015/2 Best Presentation Award - 2,500 (Indian rupee), Sri Guru Granth Sahib World University, Punjab, INDIA
- 2014/1 - 2016/7 SGGSWU Tuition Fee Scholarship - 500,000 (Indian rupee), Sri Guru Granth Sahib World University, Punjab, INDIA

Research Funding History:

- 2019/4 - 2020/3, Co-applicant, Fabrication of an efficient sea-water purification system, Academic crowdfunding Japan, Total Funding - 631,000 (Japanese yen)
- 2016/10 - 2019/9, Principal Applicant, NIMS Junior researcher, NIMS, JAPAN, Graduate Research Assistantship, Total Funding - 6,300,000 (Japanese yen)

Publications:

[1] **M. Kaur**, H Song, Plasmonic Titanium Nitride based Ammonia Synthesis by Photo-electrocatalytic Reduction of Nitrogen, *Chemical Engineering Journal*, **2023**, 45963. (*IF: 15.1*), DOI: 10.1016/j.cej.2023.145963

[2] M. Kaur, Z Li, S Meng, W Li, H Song, Electrocatalytic methane conversion to high value chemicals at ambient conditions, *Energy Conversion and Management*, **2023**, 285-117029. (*IF: 11.5*), DOI: 10.1016/j.enconman.2023.117029

[3] **M. Kaur**, S. Rej, J. Navrátil, M. Otyepka, P. Błónski, A. Naldoni. 2023. 5-hydroxymethyfurfural Conversion to high valued chemicals via plasmonic Titanium Nitride. Proceedings of the National Academy of Sciences. **2023**, 117029. (*IF: 12.7*)

[4] **M. Kaur**, R. Sadri, T. Roberts, H. Song. Electrochemically exfoliated Graphene (EEG)/ MXene Composite based Efficient Metal-Free Photo-Electrocatalyst. fuels. **2023**, 1. (*IF: 8.0*)

[5] **M. Kaur**, T. Nagao, Minireview on Solar Desalination and Hydropower Generation by Water Evaporation: Recent Challenges and Perspectives in Materials Science, *Energy & Fuels*, **2022**, 36.19. 11443-11456. (*IF: 4.6*), DOI: 10.1021/acs.energyfuels.2c02576

[6] T.N. Kevin, **M. Kaur**, S. Ishii, T. Nagao, Photothermal heating and heat transfer analysis of anodic aluminum oxide with high optical absorbance, *Nanophotonics* **2022**, 11.14: 3375-3381. (*IF: 7.9*), DOI: 10.1515/nanoph-2022-0244

[7] **M. Kaur**, S. Ishii, T. Nagao, Hydropower Generation by Transpiration from Microporous Alumina, *Scientific reports* **2021**, 10954 [11] . (*IF: 4.6*), DOI: 10.1038/s41598-021-90374-5

[8] **M. Kaur**, D. Sahu, Synthesis and Characterization of Oleic acid Stabilized CdTe Quantum Dots and its Properties as Luminescence Quencher of a Pyridine pendented Rod-Coil Homopolymer, *Materials science*, **2020**. (*IF: 4.7*), DOI: 10.2478/msp-2020-0059

[9] **M. Kaur**, S. L. Shinde, S. Ishii, N. Fukata, W. Jevasum, Y. Le, J. Ye, T. Nagao, Marimo Bead-Supported Core-Shell Nanocomposites of Titanium Nitride and Chromium-Doped Titanium Dioxide as Highly Efficient Water Floatable Green Photocatalyst, *ACS Applied Materials & Interfaces*, **2020**. (*IF: 10.4*), DOI: 10.1021/acsami.0c03781

[10] S. Ishii, S. L. Shinde, **M. Kaur**, R.P Sugavaneshwar, T. Nagao, Optical excitation of hot carriers and photothermal conversions with transition metal nitrides and transition metal carbides, *The Review of Laser Engineering* **2019**, 47[7], 365-369. (*IF: 0.5*), DOI: iss.ndl.go.jp/books/R100000002-I000000031478-00

[11] **M Kaur**, A Sharma, M Olutas, O Erdem, A Kumar, M Sharma, HV Demir. (2018). Cd-free Cu-doped ZnInS/ZnS core/shell nanocrystals: Controlled synthesisand photophysical properties. Nanoscale Research Letters. 13: 1-11. (*IF: 5.5*), DOI: 10.1186/s11671-018-2599-x

[12] S. Ishii, S.L. Shinde, R.P. Sugavaneshwar, **M. Kaur**, T. Nagao. Harvesting Sunlight with Titanium Nitride Nanostructures. *Progress in Electromagnetics Research Symposium (PIERS-Toyama)* **2018**, 1, 1286-1289. *(IF: 6.0)*, DOI:10.23919/PIERS.2018.8598236

[13] **M. Kaur**, S. Ishii, S. L. Shinde, T. Nagao, All-Ceramic Solar-Driven Water Purifier Based

on Anodized Aluminum Oxide and Plasmonic Titanium Nitride, *Advanced Sustainable Systems* **2018**, 3[2], 1800112. *(IF: 7.1)*, DOI: 10.1021/acssuschemeng.7b02089

[14] **M. Kaur**, S. Ishii, S. L. Shinde, T. Nagao, All-Ceramic Microfibrous Solar Steam Generator: TiN Plasmonic Nanoparticle-Loaded Transparent Microfibers, *ACS Sustainable Chemistry & Engineering* **2017**, 5, 8523. *(IF: 9.2)*, DOI: 10.1002/adsu.201800112

Books:

[1] S. Ishii, K. Chen, R.P Sugavaneshwar, H. Okuyama, T.D. Dao, S.L. Shinde, **M. Kaur**, M. Kitajima, T. Nagao. Efficient absorption of sunlight using resonant nanoparticles for solar heat applications. **2018**, *Wiley Online Library*, Chapter 14, Page 241-253.**DOI:** 10.1002/9783527808311.ch14:

Editorial Activities:

2023/7 Editorial Board Member, International Journal of Renewable Energy Technology, Journal

2023/5 Editorial Board Member, Thermal Science and Energy Systems, Journal