Dr. Mainak Basu, Ph.D.

Assistant Professor (Grade – II)
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Research Interest:

- Microfluidics and digital microfluidics.
- MEMS, Bio-MEMS, NEMS.
- Electrochemical and optical methods for diagnostic devices.
- Biosensors, Biomedical Instrumentation.

Education:

Degree	Specialization	Institute	Year
Ph.D.	Microfluidics and MEMS	Indian Institute of Technology Kharagpur, India	2015 – 2022
M.Tech.	Biomedical Engineering	VIT University, India	2014
B.Tech.	Biomedical Engineering	West Bengal University of Technology, India	2012

Awards:

- **ETH Postdoctoral Fellowship 2022**
- **CBMS Travel Grant Award 2019** for attending the MicroTAS Conference, Basel, Switzerland (best poster presentation).
- **MHRD Research Scholarship 2015,** Research scholar grant, Indian Institute of Technology Kharagpur (carrying out research works at IIT Kharagpur).
- **Texas Instruments India Analog Design Contest 2011,** Phase 1 contest winner.

Skills:

Experimental skills:

Electrowetting, Physical Vapour Deposition (Sputtering, Thermal evaporation deposition, Pulsed laser deposition (PLD)), photolithography, soft lithography, chemical etching, high-speed camera, electrical impedance spectroscopy (EIS), Raman spectroscopy, UV-vis spectroscopy, Fluorescence spectroscopy, Image J, Cyclic voltammetry, Confocal Microscopy, Scanning electron microscopy (SEM), Transmission electron microscopy (TEM), Optical

Microscopy, X-ray diffraction (XRD), FTIR-ATR, Atomic force microscopy (AFM), rheometer, tensiometer, DLS/Zeta, goniometer, Surface Profilometry, Rapid prototyping (SLA, SLS, FDM, DLP), Spin coating, Dip coating.

Simulation skills:

COMSOL Multiphysics, MATLAB, LABVIEW, SIMULINK, Arduino programming, Embedded based programming.

Experiences:

1. Research and teaching experiences:

NIT Raipur, Chhattisgarh, India ***Feb 2024 – Till date***
Assistant Professor (Grade – II)

ETH Zürich, Zürich, Switzerland ***July 2022 – Feb 2024***
Postdoctoral Research Scientist

Indian Institute of Technology Kharagpur, Kharagpur, India ***June 2015 – Feb 2022***

- **Doctoral Researcher, Thesis:** Design and development of a digital microfluidic platform for augmented droplet actuation and transport.

Indian Institute of Technology Madras, Chennai, India ***July 2014 – July 2015***

- **Junior Research Fellow, DRDE funded project:** Development of Surface Enhanced Raman Spectroscopy (SERS) substrates for highly sensitive and specific detection of different toxins.

2. Industry Exposure and Internships:

Mylab Discovery Solutions Pvt. Ltd., Mumbai, India ***March 2021 – June 2021***

- **Position:** Application Engineer
  Nature of Industry: Biotechnology and Healthcare

MeFy Care Pvt. Ltd., Pune, India ***Sept 2020 – Feb 2021***

- **Position:** Research and Development Engineer
  Nature of Industry: Biomedical and Healthcare

Patents:

1. P K Dey, **M Basu**, S Das, *Indian Patent 21336,* "Wire bonding technique for MEMS and microdevices using conductive paste and hot air blow applicable for both hard and flexible substrate (WBCPHAB).", March 22, 2018 (Published).

Publications:

1. S Parveen, **M Basu**, P Chowdhury, T Dhara, S DasGupta, S Das, S Dasgupta, *International Journal of Biological Macromolecules*, vol 260, 129470, March 2024,

"Surface modification of polydimethylsiloxane by the cataractous eye protein isolate", DOI: https://doi.org/10.1016/j.ijbiomac.2024.129470 (Joint First author).

2. S Das, S Chatterjee**, M Basu,** *IEEE Transactions of Dielectrics and Electrical Insulations***, vol 31, 523 – 532, December 2023, "**Hydrophobicity-Based Grading of Industrial Composite Insulators Images Using Cross Attention Vision Transformer with Knowledge Distillation", DOI: 10.1109/TDEI.2023.3347377

3. **M Basu**, VP Joshi, S Das, S DasGupta, *Journal of Electrostatics*, vol 109, 103541, January 2021, "Analysis of augmented droplet transport during electrowetting over triangular coplanar electrode array.". DOI: https://doi.org/10.1016/j.elstat.2020.103541

4. **M Basu**, V Parihar, A Lincon, VP Joshi, S Das, S DasGupta, *Chemical Engineering Science*, vol 230, 116175, February 2021, "Development of graphene oxide–PDMS composite dielectric for rapid droplet movement in digital microfluidic applications.", DOI: https://doi.org/10.1016/j.ces.2020.116175

5. R K Singh, S Sinha, A Ramaswamy, S Kannan, G Tambi, **M Basu**, *International Journal of Information Technology*, vol 6 (5), 1 – 6, October 2020, "COVID-19 AI diagnostic tool using 13 common blood parameters", ISSN: 2454-5414.

6. S Kulkarni, **M Basu**, *Journal of Biomedical Engineering and Technology*, vol 1(3), 36 – 39, November 2013, "A Review on wearable Tri-Axial Accelerometer Based Fall Detectors". DOI: https://doi.org/10.12691/jbet-1-3-2

Conferences and Symposiums:

1. **M Basu**, S Das, S DasGupta, *CBMS - MicroTAS Conference 2019, Basel, Switzerland*, vol 29, T0017.d, October 2019, "Improved dynamics for droplet actuation by strategically using triangular coplanar electrodes in the digital microfluidic system".

2. **M Basu**, S Das, S DasGupta, *Electrowetting Conference 2018, University of Twente, Enschede, Netherlands*, vol 11, June 2018, "A Novel Electrode design for Efficient Droplet actuation using EWOD".

3. M Vollmann**, M Basu,** C Roman, C Hierold, *International Symposium on Digital Twins in Healthcare (EU Horizon 2020)*, May 2024, Ayia Napa, Cyprus, "Towards strain sensing with carbon nanotubes for monitoring respiratory activity and digital twins".

Book Chapters:

1. A Sinha, **M Basu**, P Chanda, Elsevier 2021 book series on *Progress in Molecular Biology and Translational Science* entitled, Micro/nanofluidics and lab on chip-based emerging technologies for biomedical and translational research application – Part A, Volume 185 – 1st Edition, ISSN 1877-1173, Chapter: "Paper-based microfluidics: a forecast towards the most affordable and rapid point of care devices.", https://doi.org/10.1016/bs.pmbts.2021.07.010

Research presentation:

1. **CNT-FET based wearable strain sensors for measuring respiratory activities: Development and current perspectives** organized by the Department of Mechanical and Process Engineering, ETH Zurich, Zurich 8092, Switzerland on 9th September 2022.

2. **Biomedical Engineering Research and its Application: Present Day Scenario & the Future** held at the JIS College of Engineering, Kalyani, on 29th & 30th July 2011.

3. **6th International Conference on "Science, Engineering, and Technology (SET)** organized by the School of Electrical Engineering, VIT University, Vellore – 632014, Tamil Nadu, India held from May 7 – May 8, 2013.

Invited Talks:

1. "Digital Microfluidics and point of care diagnostics: Fundamentals and applications", 6th June 2021, *School of Electronics Engineering (SENSE)*, **VIT University**, Vellore, Tamil Nadu, India.