Pallavi Halkare **DOB: 01/02/1989**
Indian Institute of Technology, Bombay, India **Biomedical Engineering**
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Examination	University	Year	GPA/%
PhD (Optical Sensors)	IIT Bombay	2018	9.39/10.0
M.Sc. (Physics)	Dept. of Physics, University of Pune	2011	5.4/6.0
B.Sc. (Physics)	University of Pune	2009	91.58%
Intermediate	Kendriya Vidyalaya No.1, Pune	2006	82.8%
Matriculation	Kendriya Vidyalaya No.2, Pune	2004	84.2%

PROFESSIONAL EXPERIENCE

Assistant Professor, School of Advanced Sciences and Languages (SASL – Bioengineering) at VIT Bhopal
Jun'20 – May'21

- Working as Assistant Professor of Bioengineering in the School of Advanced Sciences and Languages.
- Have an experience of teaching core subjects like **Biosensors and MEMS, Bioinspired Designs, Bio-fluid Mechanics, Engineering Chemistry, and Engineering Design**.
- Experienced in handling different **administrative duties** like first year admissions (from July to September), was **Master of ceremony** for Fresher's Orientation Program held on 16/09/2020 (target audience size: 2000 plus participants), have been featured in different videos uploaded by VIT Bhopal on YouTube. (https://www.youtube.com/watch?v=IB8Gm4_XuEs,https://www.youtube.com/watch?v=ACUf79nbsCw&t=128s).
- **Student feedback; Engineering Design: 9.6/10; Biosensors and MEMS: 9.3/10**

Content Developer at Think and Learn Pvt. Ltd. (BYJU'S) *Jun'19-Apr'20*

- Worked as content developer for K-10 segment for CBSE and a few state boards.
- Experienced in writing scripts, storyboarding (Visualization) for Physics, Chemistry, Biology and Math.
- Worked on diverse projects like **CBSE 4th -5th Revamp**, **CBSE 6th-10th Revamp**, **BYJU'S Home Learning Program (BHLP)** and **Maharashtra state board** in a short span of 10 months at BYJU's.
- Due to good writing skills, analysis, and storyboarding skills was promoted as a reviewer for Physics, Biology, Math and Chemistry.
- Awarded as **Best Performer of the month for October 2019**, as recognition of my outstanding performance, dedication and passion towards the work.

Research Associate at IIT Bombay *Jun'18-Nov'18*
Project: Development of heavy metal sensor using *E.coli* cells
Supervisor**:** Prof. Soumyo Mukherji, *Dept. of Biosciences and Bioengineering, IIT Bombay*

- Played key role in developing sensor for detection of heavy metals using lysed *E.coli* cells.

SCHOLASTIC ACHIEVEMENTS

- Awarded **Excellence in Oral Presentation** by Optical Society of America (OSA) at Photonics 2018 held in IIT Delhi *Dec'18*
- Qualified joint **CSIR-UGC NET** and obtained **JRF in physical sciences (AIR 137)** *Aug'11*
- Awarded **Prof. S. S. Joshi award** for best performance in University of Pune *May'11*
- Awarded **best poster presentation award** at 3rd International Conference of Advanced Nanomaterials and Nanotechnology [ICANN, Dec'13] held at IIT Guwahati and Raman Memorial Conference [RMC, Feb'11] held at Dept. of Physics, University of Pune

RESEARCH EXPERIENCE

PhD Dissertation: Development of Bacteriophage & Bacteria based Optical Sensors *Jan'12-18*
Supervisor & Co-supervisor**:** Prof. Soumyo Mukherji & Prof. Kiran Kondabagil, *Dept. of Biosciences and Bioengineering, IIT Bombay*

Project 1: *E.coli* detection using Bacteriophage

- Developed a **Proof-of-concept** to detect *E.coli* in water using nanoparticle based fiber-optic platform
- Diarrheal diseases caused by pathogenic bacteria such as *E.coli* lead to illness in 550 million people annually [WHO: http://www.who.int/news-room/fact-sheets/detail/food-safety]
- Used a novel reverse sensing scheme to detect bacteria captured on the sensing surface using bacteriophages as recognition receptor
- Built a versatile model covering a wide range of temperature (20-60^{o}C) & pH (2-7) as compared to the antibody based sensors which are functional only at specific temperature and pH
- Detect as low as 1000 cfu/ml of *E.coli B40* in lake water
- POC model reduced 1) the overall cost of the sensing process with an added advantage of onsite monitoring of analytes 2) the Turn Around Time (TAT) of detection by 50% from 6 to 3 hours
- Reverse sensing scheme can be scaled for multi-bacteria detection by exposing the bacteria captured surfaces to different bacteriophage particles

Publications

- **P. Halkare**, N. Punjabi, J. Wangchuk, S. Madugula, K. Kondabagil and S. Mukherji, "Label free detection of Escherichia coli from mixed bacterial cultures using bacteriophage T4 on plasmonic fiber-optic sensor", ACS Sensors 2021, 6, 7, 2720-2727; doi. 10.1021/acssensors.1c00801 *July'21*
- **P. Halkare**, N. Punjabi, J. Wangchuk, K. Kondabagil and S. Mukherji, "Detection of bacteria using bacteriophage with hollow gold nanostructures immobilized fiber optic sensor", SPIE Photonics Europe, Proc. SPIE 9899, Optical Sensing and Detection IV, 98992Z; doi:10.1117/12.2230639. 2016 *Apr'16*
- **P. Halkare**, N. Punjabi, J. Wangchuk, K. Kondabagil and S. Mukherji, "LSPR based fiber optic sensor for detection of E.coli using bacteriophage T4", Workshop on Recent Advances in Photonics, 2015, IEEE Xplore;doi.10.1109/WRAP.2015.7805945 *Dec'15*

Project 2: Heavy Metal detection with Bacteria

- Developed a sensor to detect heavy metal pollutants in water using bacteria functionalized nanoparticle coated fiber-optic platform
- Built a cost effective sensing scheme using *E.coli B40* as recognition receptor
- Achieved detection of as low as 0.5 ppb of mercury and cadmium in tap water, a limit which is well below WHO & USEPA [United States Environmental Protection Agency] acceptable limits

Publications

- **P. Halkare**, N. Punjabi, J. Wangchuk, A. Nair, K. Kondabagil and S. Mukherji, "Bacteria functionalized gold nanoparticle matrix based fiber-optic sensor for monitoring heavy metal pollution in water", Sensors and Actuators B: Chemical 281 (2019), 643-651 [doi.org/10.1016/j.snb.2018.10.119] *Feb'19*
- **P. Halkare**, J. Wangchuk, S. Samanta, K. Kondabagil and S. Mukherji, "Mercury Detection using Lysed Bacterial Cells Immobilized LSPR Enabled Fiber-Optic Sensor", submitted. At Photonics, 2018, IIT Delhi (Accepted) *Aug'18*

Master's Dissertation: **Visual Evoked Potential (VEP) Analysis in Humans** *Jun'10-May'11*
Supervisor: Prof. Gauri Kulkarni, *Dept. of Physics, University of Pune*

- Analyzed Visual Evoked Potential (VEPs) to detect clinical conditions such as lesions in optic nerve
- Obtained **100% prediction** of healthy optic pathways of 30 individuals using time domain parameters such as latencies and amplitude of the recorded VEP waveforms
- Results from the VEP study were found to be more sensitive and less costly than those from MRI

Bachelor's Dissertation: **Electromagnetic Damping by Torsional Pendulum** *Dec'08-Apr'09*
Supervisor: Prof. P.S. Tambade, *Dept. of Physics, Prof. Ramkrishna More College, Pune*

- Analyzed the effect on damping the oscillating body (disc) in presence of electric and magnetic fields
- Damping parameters such as quality factor (Q) & damping factor (R) were measured and studied
- Demonstrated principle of electromagnetic damping which is used in induction motors & induction generators

Internship: IC-IMPACTS, University of Alberta, Canada *May'16*

- Attended an internship program on nanotechnologies organized by India-Canada Centre for Innovative Multidisciplinary Partnerships to Accelerate Community Transformations and Sustainability
- **Presented a seminar talk** on "Gold nanostructures based fiber optic sensors for detection of bacteria using bacteriophages" at the summer institute

ORAL AND POSTER PRESENTATIONS

- **Pallavi Halkare**, Jigme Wangchuk, Sonali Samanta, Kiran Kondabagil and Soumyo Mukherji, "Mercury Detection using Lysed Bacterial Cells Immobilized LSPR Enabled Fiber-Optic Sensor", Photonics, 2018, IIT Delhi **(Oral)** *Dec'18*

- **Pallavi Halkare**, Nirmal Punjabi, Jigme Wangchuk, Aswathy Nair, Kiran Kondabagil and Soumyo Mukherji,, "Detection of Heavy Metals by Bacteria - Gold Nanoparticle Matrix using Fiber Optic Sensor", International Conference on Nanotechnology and Nanoscience. 2016, VIT Vellore. **(Poster)** *Oct'16*

- **Pallavi Halkare**, Nirmal Punjabi, Jigme Wangchuk, Kiran Kondabagil and Soumyo Mukherji, "Detection of bacteria using bacteriophage with hollow gold nanostructures immobilized fiber optic sensor", SPIE Photonics Europe, 2016, Brussels, Belgium. **(Poster)** *Apr'16*

- **Pallavi Halkare**, Nirmal Punjabi, Jigme Wangchuk, Kiran Kondabagil, Soumyo Mukherji, "Localized surface plasmon resonance based fiber optic sensor for detection of *E.coli* using bacteriophage T4", workshop on recent advances in photonics (IEEE WRAP), 2015, IISc, Bangalore, India. **(Poster)** *Dec'15*

- **Pallavi Halkare**, Venkata Chelikani, Kiran Kondabagil, Soumyo Mukherji, "Evanescent wave based biosensor for detection of bacteria using bacteriophages as biorecognition elements immobilized on optical fiber", 3rd International conference of advanced nanomaterials and nanotechnology, ICANN 2013, IIT Guwahati **(Poster)** *Dec'13*

- **Pallavi Halkare**, Gauri Kulkarni, "Visual evoked potential analysis in humans", Raman memorial conference, RMC 2011, Department of Physics, University of Pune, India. **(Poster)** *Mar'11*

LEADERSHIP

Teaching Assistant	Medical Sensors (Postgraduate course)	*Sept'16-Nov'16*
Member of Senate	University of Pune	*Nov'08-Jul'09*
Operator	Environmental Scanning Electron Microscope (ESEM)	*Aug'13-Aug'15*

INTERESTS & SKILLS

Research Interests	Experimental Skills	Computing Tools
Biosensor Development	Fiber Optics	FORTRAN
Phage based Detection of Bacteria	Sensor Development	C/C++
Heavy Metal Sensing	Surface Functionalization	ESEM
Nanomaterial Integrated Devices for Sensing	Bacteriophage Purification	RSoft
Plasmonic ELISA	Nanoparticle Synthesis	ImageJ

REFERENCES

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Institute Chair Professor
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Prof. Kiran Kondabagil
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