Shiju Abraham, Ph.D.

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Employment History

2019 October - **Assistant Professor,** Department of Physics St. Pius X College Rajapuram, Kasaragod, Kerala – 671532, India.

2017 April– 2019 April **Post-Doctoral Fellow.** Zuckerberg Institute for Water Research, Ben-Gurion University of the Negev, Israel.

Guest Lecturer (Physics): St. Pius X College, Rajapuram, Kannur University. (June 24, 2019-October 16, 2019).

Education

2009 – 2016 **Ph.D., Banaras Hindu University, Varanasi, India.**
Thesis Title: *Investigations on Synthesis, Characterization and Applications of Carbon Nanostructures and their Metal/ Metal Oxide Composites.*
Supervisor: *Prof. Anchal Srivastava.*
Description: *Synthesize of graphene and graphene derivatives (GO, RGO, GNRs, GQDs, GHs), silica nanoparticles, titanium dioxide nanoparticles, zinc oxide nanoparticles, gold nanoparticles and their composites for various applications; especially in biosensing, photo catalysis, photo-luminescence and for surface enhanced Raman spectroscopy (SERS).*

2017 – 2019 **Post Doctoral Fellow, Ben-Gurion University of the Negev, Israel.**
Projects: *(1) Nano fabrication of patterned surfaces; (2) Controlling the self assembly of lipid bilayers; (3) Use AFM to study different surface 'fouling' mechanisms; (4) Defining the molecular forces and mechanical interactions between phages and bacteria.*
Supervisor: *Dr. Yair Kaufman and Dr. Bar-Zeev Edo.*
Description: *(1) Fabricatiion of various SiO_2/Si surfaces and study the self-assembly of lipid bilayers on this surfaces using potentiostat coupled atomic force microscopy. (2) Study the structural (topography) and mechanical (deformation, elasticity and stiffness) changes occurring in bacterial host E. coli following T4 infection in real-time using epifluorescence coupled atomic force microscope.*

2003 – 2005 **M.Sc. Physics, Annamalai University, Chidambaram, Tamil Nadu, India.**

1999 – 2002 **B.Sc. Physics, Kannur University, Kannur, Kerala, India**.

Research Visits During Ph.D.

Education (continued)

2014 **Prof. Sebastian Schlucker Group**: Faculty of Chemistry, University of Duisburg, Essen, Germany, (June 01-30). Alexander von Humboldt Research Group Linkage Program (Isolated Au NPs/Graphene derivatives based SERS and GERS studies.)

2013 **Prof. Klaus Von Klitzing (Nobel Laureate) and Prof. Jürgen Smet Group**: Max Planck Institute of Solid State Research, Stuttgart, Germany, (July - September and November-December). Max Planck Institute Funding (Single Particle Photoluminescence, Mechanical Exfoliation of Graphene, CVD, Clean Room Experiments).

2012 **Prof. Arnulf Materny Group**: School of Engineering and Science, Jacobs University, Bremen, Germany, (June 10 - July 31 and Aug. 15 - Aug. 26, 2011). Alexander von Humboldt Research Group Linkage Program (Time-Resolved Spectroscopy).

Prof. B. D. Malhotra Group: National Physical Laboratory, New Delhi, India, (January 01 - January 15). UGC-BHU Fellowship (Electrochemistry and Biosensing).

Prof. Jürgen Popp and Prof. Benjamin Dietzek Group: Institute of Physical Chemistry, Friedrich-Schiller-University and Leibniz-Institute of Photonic Technology, Jena, Germany, (May 05 - June 10 and August 01-20). DFG Funded Project (Photocatalytic Activity Studies on Graphene/TiO2 hybrid system).

2011 **Prof. Jürgen Popp and Prof. Michael Schmitt Group**: Institute of Physical Chemistry, Friedrich-Schiller-University, Jena, Germany, (June 10 - August 10). DFG Funded Project (Spectroscopic investigations of Nanomaterials).

Research Publications

Journal Articles

1. **Abraham, Shiju**, Y. Kaufman, F. Perreault, R. Young, and E. Bar-Zeev, "Bursting out: Linking changes in nanotopography and biomechanical properties of biofilm-forming escherichia coli to the t4 lytic cycle," *npj Biofilms and Microbiomes* ***(I.F.=8.81)***, vol. 7, no. 1, p. 26, 2021.

2. N. Siebdrath, B. Skibinski, **Abraham, Shiju**, *et al.*, "Impact of pretreatment on ro membrane organic fouling: Composition and adhesion of tertiary wastewater effluent organic matter," *Environmental Science: Water Research & Technology* ***(I.F.=5.82)***, vol. 7, no. 4, pp. 775–788, 2021.

3. **Abraham, Shiju**, T. Heckenthaler, Y. Morgenstern, and Y. Kaufman, "Effect of temperature on the structure, electrical resistivity, and charge capacitance of supported lipid bilayers," *Langmuir* ***(I.F.=4.33)***, vol. 35, no. 26, pp. 8709–8715, 2019.

4. K. Rathinam, **Abraham, Shiju**, Y. Oren, *et al.*, "Surface-induced silica scaling during brackish water desalination: The role of surface charge and specific chemical groups," *Environmental science & technology* ***(I.F.=11.35)***, vol. 53, no. 9, pp. 5202–5211, 2019.

5. **Abraham, Shiju**, T. Heckenthaler, D. Bandyopadhyay, Y. Morgenstern, and Y. Kaufman, "Quantitative description of the vesicle fusion mechanism on solid surfaces and the role of cholesterol," *The Journal of Physical Chemistry C* ***(I.F.=4.17)***, vol. 122, no. 40, pp. 22 985–22 995, 2018.

6. **Abraham, Shiju**, M. Koenig, S. K. Srivastava, V. Kumar, B. Walkenfort, and A. Srivastava, "Carbon nanostructure (0-3 dimensional) supported isolated gold nanoparticles as an effective sers substrate," *Sensors and Actuators B: Chemical* ***(I.F.=9.22)***, vol. 273, pp. 455–465, 2018.

7. V. K. Singh, H. Mishra, R. Ali, *et al.*, "In situ functionalized fluorescent ws2-qds as sensitive and selective probe for fe3+ and a detailed study of its fluorescence quenching," *ACS Applied Nano Materials* ***(I.F.=6.14)***, vol. 2, no. 1, pp. 566–576, 2018.

8. S. Kashyap, V. Kumar, **Abraham, Shiju**, *et al.*, "Microwave reduced graphene oxide as effcient nir photothermal agent," *Austin Journal of Biosensors and Bioelectronics*, vol. 3(1), p. 1026, 2017.

9. R. Singh, S. Kashyap, S. Kumar, *et al.*, "Excellent storage stability and sensitive detection of neurotoxin quinolinic acid," *Biosensors and Bioelectronics* ***(I.F.=12.54)***, vol. 90, pp. 224–229, 2017.

10. **Abraham, Shiju**, M. König, S. Pandey, S. Srivastava, B. Walkenfort, and S. Anchal, "Two dimensional carbon nanostructure supported isolated au nps as an efficient sers substrate," *Asian Journal of Physics*, vol. 25, pp. 121–126, 2016.

11. **Abraham, Shiju**, N. R. Nirala, S. Pandey, *et al.*, "Functional graphene–gold nanoparticle hybrid system for enhanced electrochemical biosensing of free cholesterol," *Analytical Methods* ***(I.F.=3.53)***, vol. 7, no. 9, pp. 3993–4002, 2015.

12. **Abraham, Shiju**, S. Srivastava, V. Kumar, *et al.*, "Enhanced electrochemical biosensing efficiency of silica particles supported on partially reduced graphene oxide for sensitive detection of cholesterol," *Journal of Electroanalytical Chemistry* ***(I.F.=4.59)***, vol. 757, pp. 65–72, 2015.

13. N. R. Nirala, **Abraham, Shiju**, V. Kumar, A. Bansal, A. Srivastava, and P. S. Saxena, "Colorimetric detection of cholesterol based on highly efficient peroxidase mimetic activity of graphene quantum dots," *Sensors and Actuators B: Chemical* ***(I.F.=9.22)***, vol. 218, pp. 42–50, 2015.

14. N. R. Nirala, **Abraham, Shiju**, V. Kumar, *et al.*, "Partially reduced graphene oxide–gold nanorods composite based bioelectrode of improved sensing performance," *Talanta* ***(I.F.=6.55)***, vol. 144, pp. 745–754, 2015.

15. S. Srivastava, **Abraham, Shiju**, C. Singh, *et al.*, "Protein conjugated carboxylated gold@ reduced graphene oxide for aflatoxin b 1 detection," *RSC Advances* ***(I.F.=4.03)***, vol. 5, no. 7, pp. 5406–5414, 2015.

16. **Abraham, Shiju**, V. Ciobota, S. Srivastava, *et al.*, "Mesoporous silica particle embedded functional graphene oxide as an efficient platform for urea biosensing," *Analytical Methods* ***(I.F.=3.53)***, vol. 6, no. 17, pp. 6711–6720, 2014.

17. V. Kumar, V. Singh, S. Umrao, *et al.*, "Facile, rapid and upscaled synthesis of green luminescent functional graphene quantum dots for bioimaging," *Rsc Advances* ***(I.F.=4.03)***, vol. 4, no. 40, pp. 21 101–21 107, 2014.

18. S. Umrao, **Abraham, Shiju**, F. Theil, *et al.*, "A possible mechanism for the emergence of an additional band gap due to a ti–o–c bond in the tio 2–graphene hybrid system for enhanced photodegradation of methylene blue under visible light," *RSC advances* ***(I.F.=4.03)***, vol. 4, no. 104, pp. 59 890–59 901, 2014.

Conference Proceedings

1. M. K. Singh, K. Kumbhakar, A. Srivastava, **Abraham, Shiju**, and H. Mishra, "Synthesis and characterization of nanostructured sno2/graphene composite thin film: Highly sensitive uv-sensor," in *conf. proc. ICOL-2014*, Dehradun, 2014.

2. S. Umrao, **Abraham, Shiju**, A. Sinhamahapatra, and A. Srivastava, "High quality, high density growth of carbon-nitrogen-nanotubes using pyridine as precursor," in *UPMUL00600*, Varanasi, Uttar Pradesh, 2012, ISSN-2319–5827.

Books and Chapters

1 **Abraham, Shiju**, *Surfaces and Modified Surfaces for Controlling the Pollution: Different Approaches-Springer Publishers*. 2021, pp. 307–341.

Skills

Languages	Strong reading, writing and speaking competencies for English, Hindi and Malayalam.
Computer skills	Adobe illustrator, CorelDraw, Photoshop, LATEX, MS Office.
Research Softwares	Origin, Peakfit, Mendeley, Endnote.

Research and Teaching Interest

- **Research In-hand Experience**: Clean room experiments, E-Line lithography, Photolithography, Chemical vapor deposition, e-gun deposition, Profilometer, Ellipsometry, Wet and Dry Etching, AFM-Potentiostat (JPK), SEM, Raman spectroscopy (WITec), UV-vis spectrometer, PL spectrometer, FTIR spectrometer, Autolab Potentiostat/ Galvanostat.

- **Area of Interests**: Surface Science, Surface Probe Microscopy, Nanoscience and Technology, Biophysics, Electronics

Conferences/ Workshops/ Schools

- International conferences (06); International Workshops (04); National conferences (03); Invited talk (04); Regional conferences (04); Symposium (01); Winter/Summer Schools (02).
- Induction Course -01, Refresher Course-01.

Achievements

- An All India Rank of 184 [Percentile 95.87] for Joint Entrance Screening Test [JEST] for Physics-2008.

Research Score

- Total Citations as on July 10, 2023: 671
- h-index: 12
- i10-index: 13

References

1 Prof. Anchal Srivastava, Department of Physics, Institute of Science, Banaras Hindu University, Varanasi-221005, India. Ph. +91 9453203122 E-Mail: anchalbhu@gmail.com

2 Dr. Yair Kaufman, University of California Santa Barbara, BioEngineering Department, Santa Barbara, CA, USA. Ph. +1-805-3968642 E-Mail: yairkauf@icloud.com

3 Dr. Edo Bar-Zeev, The Zuckerberg Institute for Water Research, Jacob Blaustein Institutes for Desert Research, Ben-Gurion University of the Negev, Israel. Ph. +972 50 9007296 E-Mail: edobarzeev@gmail.com