

# Shiju Abraham

## Curriculum Vitae

Assistant Professor  
Department of Physics  
St. Pius X College  
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Kasaragode, 671532, Kerala, India



### Education

- 2017 April- **Post Doctoral Fellow**, *The Zuckerberg Institute for Water Research, Ben-Gurion University of the Negev*, Beer-Sheva, Sede Boqer Campus, Israel.
- 2019 April
- 2009–2016 **Ph.D. Physics**, *Banaras Hindu University*, Varanasi, Uttar Pradesh, India.  
Degree awarded: Feb.19, 2016
- 2003–2005 **M.Sc. Physics**, *Annamalai University*, Chidambaram, Tamil Nadu, India.  
Degree awarded: Oct.25, 2005
- 1999–2002 **B.Sc. Physics**, *Kannur University*, Kannur, Kerala, India.  
Degree awarded: March 03, 2003

### Post Doctoral Research

- Title *(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*
- Supervisors Dr. Yair Kaufman and Dr. Bar-Zeev Edo
- Description (1) Fabricatiion of various SiO<sub>2</sub>/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

### PhD Thesis

- Title *Investigations on Synthesis, Characterization and Applications of Carbon Nanostructures and their Metal/ Metal Oxide Composites*
- Supervisor Prof. Anchal Srivastava (ex-supervisor: Late Prof. B.P.Asthana)
- 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)

## Experience

### Research (Instruments and Techniques)

- **Clean room experience:-** E-Line lithography (Raith e-LiNE), Photolithography (Karl Suss Mask Aligner), Chemical vapor deposition (Expertech), 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

### Research Visits During Ph.D

- 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)
- 2012 **Prof. B. D. Malhotra Group**, *National Physical Laboratory, New Delhi, India*, (January 01 - January 15).  
UGC-BHU Fellowship  
(Electrochemistry and Biosensing)
- 2012 **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/TiO<sub>2</sub> 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)

### Teaching

- 2015–2016 **Guest Lecturer (Physics and Electronics)**, *S.E.S. College, Kannur University*.  
(Sept. 08, 2015-March 31, 2016)
- 2019 **Guest Lecturer (Physics)**, *St. Pius X College, Rajapuram, Kannur University*.  
(June 24, 2019-October 16, 2019)
- 2019 **Asst. Prof. (Physics)**, *St. Pius X College, Rajapuram, Kannur University*.  
(October 17, 2019-till now)

## Languages

English	<b>Fluent</b>	<i>Daily practice, all work performed in English</i>
Hindi	<b>Fluent</b>	<i>Daily practice</i>
Malayalam	<b>Fluent</b>	<i>Mother Tongue</i>

## Computer skills

Adobe illustrator, CorelDraw, Origin, Peakfit, Mendeley, End-note  
Photoshop, AutoCAD, MS Office, LATEX

## Achievements

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

## Conferences/ Workshops/ Schools

- International conferences (06)
- National conferences (02)
- Regional conferences (04)
- Schools (02)
- Workshops (04)
- Invited talks (03)
- Symposium (01)

## References

- **Prof. Anchal Srivastava**, Department of Physics, Institute of Science, Banaras Hindu University, Varanasi-221005, India  
Ph. +91 9453203122  
E-Mail: [anchalbhu@gmail.com](mailto:anchalbhu@gmail.com)
- **Dr. Yair Kaufman**, University of California Santa Barbara, BioEngineering Department, Santa Barbara, CA, USA  
Ph. +1-805-3968642  
E-Mail: [yairkauf@icloud.com](mailto:yairkauf@icloud.com)
- **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](mailto:edobarzeev@gmail.com)

## Publication List

### International refereed journals (IF= Impact Factor)

- 1 **Shiju Abraham**, Tabea Heckenthaler, Yakov Morgenstern and Yair Kaufman. Effect of temperature on the structure, electrical resistivity, and charge capacitance of supported lipid bilayers. *Langmuir*, 35: 8709-8715, 2019 (**IF-3.68**)

- 2 Karthik Rathinam, **Shiju Abraham (Equally Contributed)**, Yoram Oren, Dietmar Schwahn, Winfred Petry, Yair Kaufman and Roni Kasher. Surface-induced silica scaling during brackish water desalination: The role of surface charge and specific chemical groups. *Environmental Science and Technology*, 53: 5202-5211, 2019 **(IF-7.15)**
- 3 Vijay K. Singh, Himanshu Mishra, Rashid Ali, Sima Umrao, Rajesh Srivastava, **Shiju Abraham**, Arvind Misra, Vidya Nand Singh, Hirdyesh Mishra, R.S.Tiwari and Anchal Srivastava. In situ functionalized fluorescent WS<sub>2</sub>-QDs as sensitive and selective probe for Fe<sup>3+</sup> and a detailed study of its fluorescence quenching. *ACS Applied Nano Materials*, 2: 566-576, 2019 **(IF-yet to announce)**
- 4 **Shiju Abraham**, Tabea Heckenthaler, Dyuti Bandyopadhyay, Yakov Morgenstern and Yair Kaufman. Quantitative description of the vesicle fusion mechanism on solid surfaces and the role of cholesterol. *Journal of Physical Chemistry C*, 122: 22985-22995, 2018 **(IF-4.31)**
- 5 **Shiju Abraham**, Matthias König, Sunil Srivastava, Vinod Kumar, Bernd Walkenfort and Anchal Srivastava. Carbon nanostructure (0-3 dimensional) supported isolated gold nanoparticles as an effective SERS substrate. *Sensors and Actuators B. Chemical*, 273: 455-465, 2018 **(IF-6.39)**
- 6 Ranjana Singh, Sunayana Kashyap, Suveen kumar, **Shiju Abraham**, Tejendra K. Gupta, Arvind M. Kayastha, Bansi D. Malhotra, Preeti Suman Saxena, Anchal Srivastava, Ranjan K.Singh. Excellent storage stability and sensitive detection of neurotoxin quinolinic acid. *Biosensors and Bioelectronics*, 90: 224-229, 2017 **(IF- 9.52)**
- 7 Sunayana Kashyap, Vinod Kumar, **Shiju Abraham**, Sima Umrao, Siddharath Singh, Arpana Kamath, Rajala MS, Anchal Srivastava and Preeti S Saxena. Microwave reduced graphene oxide as efficient NIR photothermal agent. *Austin Journal of Biosensors and Bioelectronics*, 3(1): 1026, 2017
- 8 **Shiju Abraham**, Matthias König, Shobhit Pandey, Sunil Srivastava, Bernd Walkenfort and Anchal Srivastava. Two dimensional carbon nanostructure supported isolated Au NPs as an efficient SERS substrate. *Asian Journal of Physics*, 25: 121-126, 2016
- 9 **Shiju Abraham**, Saurabh Srivastava, Vinod Kumar, Shobhit Pandey, Pankaj Kumar Rastogi, Narsingh R Nirala, Sunayana Kashyap, Sunil Srivastava, Vidya Nand Singh, Vellaichamy Ganesan, P.S Saxena and Anchal Srivastava. Enhanced electrochemical biosensing efficiency of silica particles supported on partially reduced graphene oxide for sensitive detection of cholesterol. *Journal of Electroanalytical Chemistry*, 757:65-72, 2015 **(IF- 3.2)**
- 10 **Shiju Abraham**, Narsingh R. Nirala, Shobhit Pandey, Monika Srivastava, Sunil Srivastava, Bernd Walkenfort and Anchal Srivastava. Functional graphene-gold nanoparticle hybrid system for enhanced electrochemical biosensing of free cholesterol. *Analytical Methods*, 7:3993-4002, 2015 **(IF- 2.38)**

- 11 Narsingh R Nirala, **Shiju Abraham**, Vinod Kumar, Anushka Bansal, Anchal Srivastava and Preeti S Saxena. Colorimetric detection of cholesterol based on highly efficient peroxidase mimetic activity of graphene quantum dots. *Sensors and Actuators B. Chemical*, 218: 42–50, 2015 **(IF-6.39)**
- 12 Narsingh R Nirala, **Shiju Abraham**, Vinod Kumar, Shobhit Pandey, Monika Srivastava, Sanjay K Srivastava, Vidyanand Singh, Arvind M Kayastha, Anchal Srivastava and Preeti S Saxena. Partially reduced graphene oxide-gold nanorods composite based bioelectrode of improved sensing performance. *Talanta*, 144:745–754, 2015 **(IF-4.92)**
- 13 Saurabh Srivastava, **Shiju Abraham**, Chandan Singh, Md. Azahar Ali, Anchal Srivastava, Gajjala Sumana and Bansi D. Malhotra. Protein conjugated carboxylated gold@reduced graphene oxide for aflatoxin B1 detection. *RSC Advances*, 5:5406–5414, 2015 **(IF-3.05)**
- 14 Sima Umrao and **Shiju Abraham (Equally Contributed)**, Frank Theil, Shobhit Pandey, Valerian Ciobota, P. K. Shukla, Caroline J. Rupp, Sudip Chakraborty, Rajeev Ahuja, Jurgen Popp, Benjamin Dietzek and Anchal Srivastava. A possible mechanism for the emergence of an additional band gap due to a Ti-O-C bond in the TiO<sub>2</sub>-graphene hybrid system for enhanced photodegradation of methylene blue under visible light. *RSC Advances*, 4:59890–59901, 2014 **(IF-3.05)**
- 15 **Shiju Abraham**, Valerian Ciobota, Saurabh Srivastava, Sunil K. Srivastava, Rajesh K. Singh, Jan Dellith, B. D. Malhotra, Michael Schmitt, Jurgen Popp and Anchal Srivastava. Mesoporous silica particle embedded functional graphene oxide as an efficient platform for urea biosensing. *Analytical Methods*, 6:6711–6720, 2014 **(IF-2.38)**
- 16 Vinod Kumar, Vimal Singh, Sima Umrao, Vyom Parashar, **Shiju Abraham**, Anand K. Singh, Gopal Nath, Preeti S. Saxena and Anchal Srivastava. Facile, rapid and upscaled synthesis of green luminescent functional graphene quantum dots for bioimaging. *RSC Advances*, 4:21101–21107, 2014 **(IF-3.05)**

#### Conference papers

- 17 Manish K Singh, Pathik Kumbhakar, Anchal Srivastava, **Shiju Abraham** and Himanshu Mishra. Synthesis and characterization of nanostructured SnO<sub>2</sub>/graphene composite thin film: Highly sensitive uv-sensor. **conf. proc. ICOL-2014**, Dehradun, 2014
- 18 Sima Umrao, **Shiju Abraham**, Anirban Sinhamahapatra and Anchal Srivastava. High quality, high density growth of carbon-nitrogen-nanotubes using pyridine as precursor. **UPMUL00600**, ISSN-2319-5827, 2012

#### Submitted/ under preparation

- 19 **Shiju Abraham**, Yair Kaufman, Francois Perreault, Ry Young, and Bar-Zeev Edo. Real-time changes in nano-topography and biomechanical properties of biofilm-forming *Escherichia coli* during T4 infection. (To be submitted in *Nature Communications*) **(IF-11.88)**

- 20 Nadine Siebdrath, Bertram Skibinski, **Shiju Abraham**, Robert Berger, Noa Stein, Zelichover, Yair Kaufman, André Lerch, Moshe Herzberg. Impact of pretreatment on RO membrane organic fouling: Adhesion properties and composition of tertiary wastewater effluents. (To be submitted in *Journal of Membrane Science*) (IF-7.02)
- 21 **Shiju Abraham**, Yair Kaufman, Francois Perreault, and Bar-Zeev Edo. Probing *in situ* the structural degradation and mechanical changes of *Escherichia coli* biofilms by T4-bacteriophages: An AFM-OCT based approach. (*work on progress*)
- 22 Vimal Singh, Vijay Singh, **Shiju Abraham**, Debraj Gangopadhyay, Anchal Srivastava and Preeti S Saxena. Ultrasensitive detection of prostate cancer biomarker using SERS active silver islands platform. (*work on progress*)

#### Book Chapter

- 1 **Shiju Abraham**. Surfaces and Surface Modifications for Controlling the Pollution: Different Approaches. (Invited to contribute in the book 'Pollution Control Technologies: Current Status and Future Prospect' by '*International Society for Energy and Environmental Sustainability*' (ISEES)- Springer). (under preparation)