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Tinkering Lab Technical Workshops Series – 2017

Two Days Hands-on Workshop on

Optics and Spectroscopy for Medical Diagnostics
Learn- Make –Explore!

- Organized by Venture Center

Learn	• Fundamental concepts of optics and spectroscopy in order to provide an understanding of the important aspects of using these techniques for developing devices and solutions for medical diagnostics applications. • Demonstration of basic concepts and methods and hands-on workshop with discussions using entrepreneurial case studies
Organized by	Tinkering lab, Venture Center.
For whom	• Industry professionals • Innovators & Entrepreneurs • Researchers and students
When	10th- 11th March 2017
Where	Venture Center, 900 NCL Innovation Park, Lecture theater Dr. Homi Bhabha (Pashan) Road, Pune-411008
Contact	Ms. Lipika Biswas Venture Center, 100, NCL Innovation Park, Dr. Homi Bhabha Road, Pune – 411008; Phone: +91-20-2586-5877; Email: eventsdesk@venturecenter.co.in
Cost	• Students with valid ID card: Rs. 2,000/- • Micro and small enterprises/ individuals: Rs. 3,000/- • Medium and large companies/ others: Rs. 5,000/-

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Introduction

Optical diagnostics occupies a very important place in medical science. In medical applications, the analysis of spatial, time and spectral dependences of the optical radiation permits revealing the characteristics of materials & systems which are hard and in some cases impossible to achieve by other methods. Further, there is a significant scope for research and development in optics and photonics. Hence, our Optical Facility in the Tinkering Lab for inventors and entrepreneurs offers a wide range of optical instruments covering UV-Vis-NIR portion of the electromagnetic spectrum for the characterization of variety of organic, inorganic, biological and environmental samples for application in medical sciences and hardware facilities for prototyping of devices/instruments for medical diagnostics applications. The workshop will provide an in-depth understanding of various concepts in optics and spectroscopy and hands-on experiments, case studies specifically geared towards leveraging Venture Centre, Tinkering lab facilities to realize functional prototypes for various medical diagnostics applications.

Course Outline

Talks

- Basics of optics
- Design of optical components
- Introduction to spectroscopy
  a. Reflection & absorption spectroscopy b. Fluorescence Spectroscopy
  c. Raman Spectroscopy d. IR Spectroscopy
- Different challenges in optical study & experiments
- Entrepreneurial case studies
- Applications in Medical Diagnostics

Laboratory sessions

- Optical components and systems design
- Reflection and absorption spectroscopy
- Fluorescence spectroscopy
- IR and Raman Spectroscopy
  Hands-on-training on using tinkering lab optical and spectroscopy facilities
- Fun activities
- Case study demonstrations by entrepreneurs

Course includes

- Course notes including slides, case studies, application notes
- Live demo and hands-on session in optics lab
- Access to restricted website
- Spectroscopy data analysis exercise

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- Intense one-on-one discussions with experts and entrepreneurs working in this area
- Certificate of participation issued by Venture Center

*** Please note the participants will have to arrange for their own travel, local transport and accommodation.**

Schedule		
Time	Session title	Faculty
Day 1 : 10th March 2017		
0830-0900	Registration : 900 Foyer Area	
0900-0930	Welcome to Venture Center and introduction to the workshop	V. Premnath
0930-1000	Basics of optics [Introduction to light waves, reflection/transmission at interfaces, absorption, diffraction & polarization phenomenon]	Bala Pesala
1000-1030	Tea/coffee break	
1030-1300	Design of optical components and systems (Introduction to Ray optics formulation and Ray tracing software)	Bala Pesala
1300-1400	Lunch	
1400-1445	Demonstration of entrepreneurial case study	Tanuj Gigras
1445-1545	Demos on Interference and Diffraction Hands on session: Reflection, Transmission, and Absorption spectroscopy characterization of samples/materials	Bala Pesala Girish Arabale
1545-1600	Tea/coffee break	
1600-1700	Demos continued	Bala Pesala Girish Arabale
1700-1730	Question and Answers	All faculty
Day 2 : 11th March 2017		
0900-1100	Introduction to basics of Spectroscopy: Fluorescence, NIR, IR and Raman	Bala Pesala Girish Arabale
1000-1030	Tea/coffee break	
1030-1300	Spectroscopy applications in Medical Diagnostics	Bala Pesala
1300-1400	Lunch	
1400-1600	Hands on session: Raman Spectroscopy and Fluorescence Spectroscopy	Girish Arabale Bala Pesala
1600-1615	Tea/coffee break	
1615-1700	Demonstration of entrepreneurial case study	Geethanjali Radhakrishnan John King

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1700-1715	Question and Answers	All faculty
1715-1730	Feedback and Valedictory	

Faculty	
Bala Pesala 	Bala Pesala is currently a senior scientist at Council of Scientific and Industrial Research (CSIR), Chennai and an assistant professor at Academy of Scientific and Innovative Research (AcSIR). His research interests range from Solar energy, Terahertz imaging, Integrated photonics to non-invasive diagnostics. Bala has received his B.Tech and M.Tech both in Aerospace engineering from IIT Madras in 2003. He received his PhD in Electrical Engineering from University of California at Berkeley in 2009. His thesis work was focused on slow and fast light using semiconductor optical amplifiers for RF and all-optical communication applications. At Berkeley, he also received minor degrees in Business and Nanotechnology. Subsequently, he did his post-doctoral research in the same group on using novel high-contrast gratings for Integrated optics. He received several awards including CSIR Young Scientist Award (2016), Demitri Angelakos memorial achievement award (UC Berkeley 2009), Rafael Rodriguez Golden Age Fellowship (UC Berkeley) and Silver medal for the highest GPA in Aerospace engineering (IIT Madras 2003) to name a few. He has authored/co-authored more than 50 publications in leading peer reviewed journals and conferences.
Girish Arabale 	Girish is Founder, Molqbits Sensors & Data Pvt Ltd, Pune ,& incubated at Venture Center. He obtained his PhD [Carbon Nanostructures] from National Chemical Laboratory, Pune. His research Interests include Raman Spectroscopy, Nanoscale Carbon, Energy Storage Technologies, Open-Source Hardware, Data Visualizations, Biohacking.
Tanuj Gigras 	Tanuj is a serial entrepreneur in the material science and engineering technology space. He holds a B.Tech and M.Tech in Engineering Physics with specialization in nanotechnology from IIT Bombay and has previously worked as an investment banker with Credit Suisse, a large Swiss Investment Bank. He brings in a unique combination of technology, business and finance. He is the founder of Nayam Innovations which is funded by BIRAC, Villgro and Venture Center to develop a novel ocular implant.

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Geethanjali Radhakrishana 	Geethanjali is a biomedical engineer and founder of a startup Adiuvo diagnostics. They develop low cost diagnostic devices in health care customized for low resource settings leveraging optics and electronics. She aim to develop a rapid screening "SKINSCOPE" device that can detect and identify pathogens non-invasively in less than a minute.
John King 	John King Hardware Engineer at Adiuvo Diagnostics Private Limited has been working on building medical diagnostic devices that specifically cater to low resource settings. Prior to this he had majorily worked in designing of Hardware Architectures and Embedded Platforms which were used in wearables, noninvasive blood pressure monitoring devices and Data Acquisition Systems

About the organizers	
	About Tinkering Lab The Tinkering Lab is a facility developed and managed by Venture Center, NCL Innovation Park, Pune, India. The main aim of the Tinkering Lab is to help inventors and entrepreneurs to build prototypes of their ideas and generally "tinker" around exploring new ideas. The focus is on electronics, instrumentation and optics besides related prototyping and design. For more information about Tinkering Lab: http://tinkeringlab.co.in/
	About Venture Center Entrepreneurship Development Center (Venture Center) – a CSIR initiative – is a Section 60 company hosted by the National Chemical Laboratory, Pune. Venture Center strives to nucleate and nurture technology and knowledge-based enterprises by leveraging the scientific and engineering competencies of the institutions in the Pune region in India. The Venture Center is a technology business incubator supported by the Department of Science & Technology's National Science & Technology

	Entrepreneurship Development Board (DST-NSTEDB). Venture Center focuses on technology enterprises offering products and services exploiting scientific expertise in the areas of materials, chemicals and biological sciences & engineering. For more information, visit http://www.venturecenter.co.in/