Photonics 2023, IISc, 5-6th July 2023: TUTORIAL

Optics in Medical Diagnostics – Shedding light on Blood Tests

Presenter: Dr. Mohiudeen Azhar, Center for Innovation in Diagnostics, Siemens Healthineers

Duration: 2 hours including Q&A

Target Audience: Students, Academic and Industry professionals from diverse specializations

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Application of optical methods to Medical Diagnostics (45 minutes+ 15 min break)

A diagnostic test, such as a blood test, is a pre-requisite for almost any healthcare diagnosis today. An introduction to common diagnostic tests and how optical methods play a pivotal role in helping healthcare professional make vital decisions which treating patients.

- Detecting a Heart Attack in an ICU setting
- Covid test: nanotechnology and optics behind Covid Testing
- Counting and classifying blood cells
- How are Specific analytes measured in blood
- How a clinical lab can process hundreds of blood samples in an hour

Concepts Discussed: Spectroscopy, Beer-Lamberts law, Flow cytometry, Scattering, Fluorescence, Chemiluminescence, Immunoassays, Nanobeads, etc

Case Study: Hemolysis detection in blood (15 minutes)

Spectroscopic measurements in diagnostics have been enhanced by developments in the nanotechnology and semiconductor industry. Hemolysis, for example, is one of the most common reasons for the rejection of a blood sample by a lab. A spectroscopic quality check on a blood sample that can help flag Hemolysis early, will be discussed.

General Interest Topics for a career in optics (15 Minutes)

Question and Answer, **Discussion** (30 min)

Presenter Introduction: Azhar is currently a Senior Key Expert for Opto-Mechanical systems at the Center for Innovative Diagnostics, Siemens Healthineers, Bangalore. He completed his PhD from the Max Planck Institute for the Science of Light in Erlangen, Germany where he worked on Nonlinear Optics in Micro-structured Photonic Crystal Fibers. He worked on breath analysis for disease diagnosis as a Marie Curie Postdoctoral Fellow in Nijmegen, Netherlands before returning to India to join a microfluidics startup, Achira Labs, in Bangalore. He joined Siemens Healthineers in 2017.