

Report on One Week Faculty Development Programme on “Recent trends in Advanced Materials and Applications”

A one week faculty development programme on “Recent trends in Advanced Materials and Applications” was organised by Department of Physics, The National Institute of Engineering, Mysuru from 19th October to 23th October, 2020. The FDP programme received an overwhelming response with more than 250 participants. The FDP aims to provide opportunities to faculty members and research scholars to enrich their knowledge in the above field. The FDP was attended by participants from all over india.

On Day one, the programme was inaugurated in the morning 19-10-2020 (Monday) at 9.00 AM by **Dr. N. C. Shivaprakash**, Professor, Department of Instrumentation, IISc, Bengaluru, **Dr. Rohini Nagapadma**, Principal, NIE, Mysuru, **Dr. N V Raghavendra**, Vice- Prinicipal, NIE Mysuru, Dean, Hods and faculties of various department of NIE along with coordinators of the FDP programme.

The National Institute of Engineering
(An Autonomous Institute under Visweswaraya Technological University, Belagavi)
Manandavadi Road, Mysuru-570008
Department of Physics

One Week Faculty Development Programme on Recent trends in Advanced
materials and Applications
(19-10-2020 To 23-10-2020)
Inaugural Session
19th October 2020 Time: 9am to 10 am

Presidential Remarks
Dr. Rohini Nagapadma
Principal
The National Institute of Engineering
Mysuru

Keynote Address
Dr. N C Shivaprakash
Professor
Department of Instrumentation
Indian Institute of Science, Bangalore

Keynote Address was given by Dr. N. C. Shivaprakash where he stated “Without science there is no engineering and without science and engineering there is no technology” followed by Presidential Address from our beloved Principal

Dr. Rohini Nagapadma, wished all the very best and success for the Faculty Development Programme. The inauguration programme ended with vote of thanks by Dr. Sankarshan B M .

Day 1 (19/10/2020)

The first Session started with the speaker **Dr. M. S. Ramachandra Rao**, Professor, Department of Physics, IIT Madras, Chennai, on “Physics and Technology of Advanced Materials, Quantum materials and Nanostructured Thin films”. He discussed about ultimate engineering material – Lab grown diamond, Nano and Quantum applications.



“Physics and Technology of Advanced Materials, Quantum Materials and Nanostructured Thin Films”

IITM

M.S. Ramachandra Rao, FInstP
Department of Physics,
Material Science Research Centre,
Nano Functional Materials Technology Centre,
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Section Editor, INTERMAT, JPhyD, IoPP, UK

Nanoscience and Nanotechnology: Fundamentals to Frontiers

MSR Rao

Session 2 was addressed by **Dr. Velumurugan**, Professor, Department of Chemistry, University of Madras, Chennai on “Molecular Structures and Structure Based Drug Design”, who discussed step by step procedure to solve small molecular structure.

MOLECULAR STRUCTURES, MOLECULAR MODELLING AND STRUCTURE BASED DRUG DESIGN

DR.D.VELMURUGAN
RESEARCH PROFESSOR
SRMIST, SCHOOL OF BIOENGINEERING,
DEPT OF BIOTECH.
KATTANKULATHUR
TAMILNADU



Day 2 (20/10/2020)

Session 1 was addressed by **Dr. Ramesh L Gardas**, Professor, Department of Chemistry, IIT Madras, Chennai, on “Ionic Liquids as Promising Solvents for Sustainable Developments in Technological Applications” who discussed about green chemistry, problems with volatile organic compound and the challenges with ewaste.

Online FDP National Institute of Engineering, Mysuru

Ionic Liquids *as* Promising Solvents *for* Sustainable Developments *in* Technological Applications



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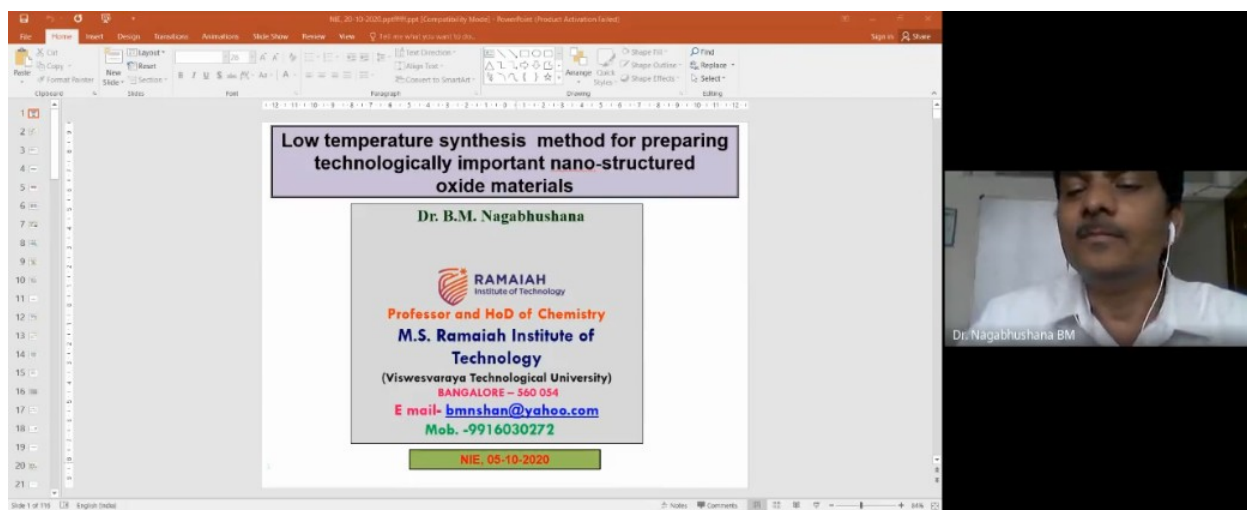
20 Oct 2020



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Session 2 was addressed by **Dr. B M Nagabhushana**, Professor & HoD of Department Chemistry, M.S. Ramaiah Institute of Technology, Bangalore on “Low temperature synthesis method for preparing technologically important nano-structured materials” who discussed about Morphology changes with temperature, different synthesis process and combustion method.




Day 3 (21/10/2020)

Session 1 was addressed by **Dr. P S Anil Kumar**, Professor, Department of Physics, Indian Institute of Science, Bangalore on “Introduction to Quantum Materials” who discussed about majorana fermions, how it is attracting people for quantum computation and topological insulators.


Physics and technology with Quantum materials

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Abhishek Banerjee




Ananthes S




Abhinab



R. Ganesan




Collaborators
Diptiman Sen, IISc Bangalore,
Biju RajaSekhar, IOP Bhubaneswar



Acknowledgement (funding)

- > Nanomission, DST
- > DAE, DST, DIT
- > Max-Planck Society
- > National Nano Fabrication Centre, IISc.

- > [Nanoscale, 9 \(2017\) 6755](#)
- > [Applied Physics Letters 110 \(2017\) 162102](#)
- > [Journal of Physics: Condensed Matter 29 \(2017\) 185001](#)
- > [Applied Physics Letters 109 \(2016\) 232408](#)
- > [Scientific Reports 7 \(2017\) 4567](#)
- > [Physical Review B 98 \(2018\) 155423](#)
- > [Applied Physics Letters 113 \(2018\) 072105](#)
- > [ACS Nano 12, 12 \(2018\) 12665](#)
- > [Nano Letters 19 \(2019\) 1625](#)
- > [Nanoscale \(2019\) 10.1039/C8NR10306B](#)



Session 2 was addressed by **Dr. K J Mallikarjunaiah**, Assistant Professor, Department of Physics MS Ramaiah University of Applied Sciences, Bengaluru on “Study of Nanomaterials for Biological and Materials Science Applications: Solid-State NMR Perspective” who discussed in detail what is NMR and how it is classified.

Why Cellular Membranes?

Segmental Fluctuations Molecular Diffusion Viscoelastic Membrane Deformation

Ω_{pf} Ω_{IM} Ω_{MD}

10^{-12} 10^{-9} 10^{-6} 10^{-3} 1 τ_c / s

← Atomistic MD Simulation ← NMR Spin-Lattice Relaxation Dispersion ← Coarse Grained MD Simulation
 ← Inelastic Neutron Scattering ← X-Ray Scattering ← Fluorescence Correlation Spectroscopy
 ← Infrared / Raman Spectroscopy ← NMR Lineshape ← ESR / EPR ← NMR Transverse Relaxation Dispersion →

Mallikarjunaiah:Kodirampura Jayaramappa

Day 4 (22/10/2020)

Session 1 was addressed by **Dr. G Paramesh**, Assistant Professor, Department of Physics, Sri Sathya Sai Institute of Higher Learning, Prashanthi Nilayam on “Glassy State of Matter: Experimental studies on understanding the glassy state” who spoke in detail about Collidal glasses.

Paramesh, Dept of Physics, SSSIHL, PSN.

Glass structure

- Short range order
- Structural units similar to their crystalline counterpart
- With variation in bond angles and distances

SiO₂ glass: SiO₄

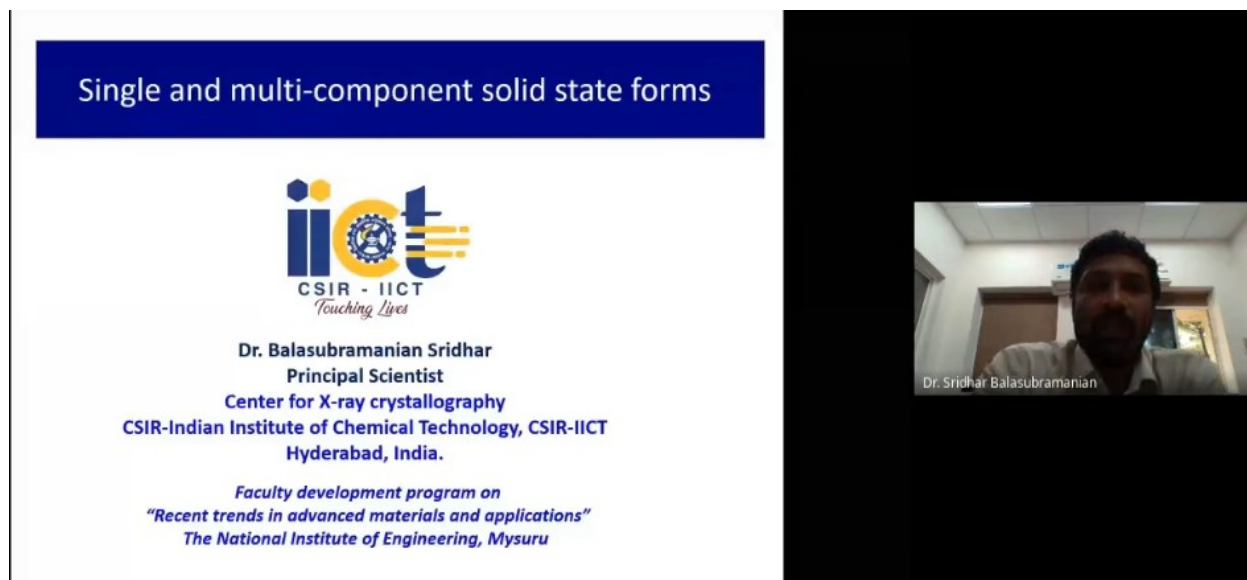
B₂O₃ glass : BO₃ triangles- Boroxol Ring

Two-Dimensional Silica Glass on Graphene

- ❖ Composition changes the structure of the glass
- ❖ Properties depend on the structure
- ❖ Raman spectra

Dr. G. Paramesh, Asst. Professor, Physics, SSSIHL

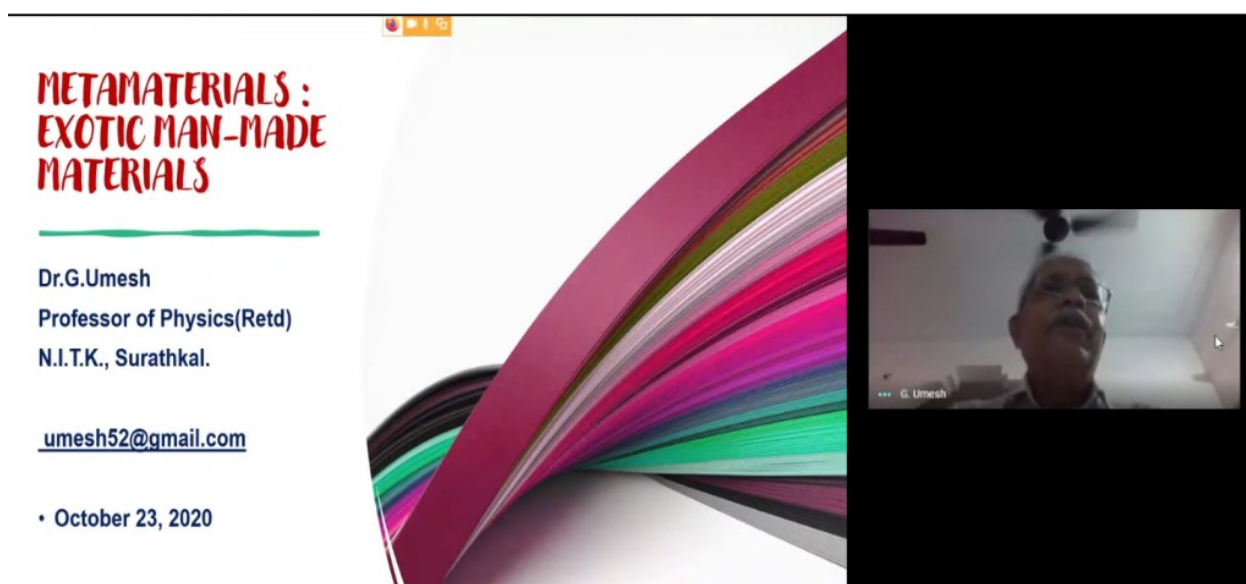
Session 2 was addressed by **Dr. B Sridhar**, Principal Scientist, CSIR Indian Institute of Chemical Technology Hyderabad on "Single and multi-component solid state forms" who discussed about crystallography and material characterization using X-ray.



The image shows a presentation slide on the left and a video feed of Dr. B Sridhar on the right. The slide has a blue header with the text "Single and multi-component solid state forms". Below the header is the logo for CSIR - IICT, which includes a stylized 'iict' and the tagline "Touching Lives". The speaker's name and title are listed: "Dr. Balasubramanian Sridhar, Principal Scientist, Center for X-ray crystallography, CSIR-Indian Institute of Chemical Technology, CSIR-IICT, Hyderabad, India." At the bottom of the slide, it mentions a "Faculty development program on 'Recent trends in advanced materials and applications' at The National Institute of Engineering, Mysuru". The video feed shows Dr. Sridhar in a white shirt, with his name "Dr. Sridhar Balasubramanian" displayed at the bottom of the frame.

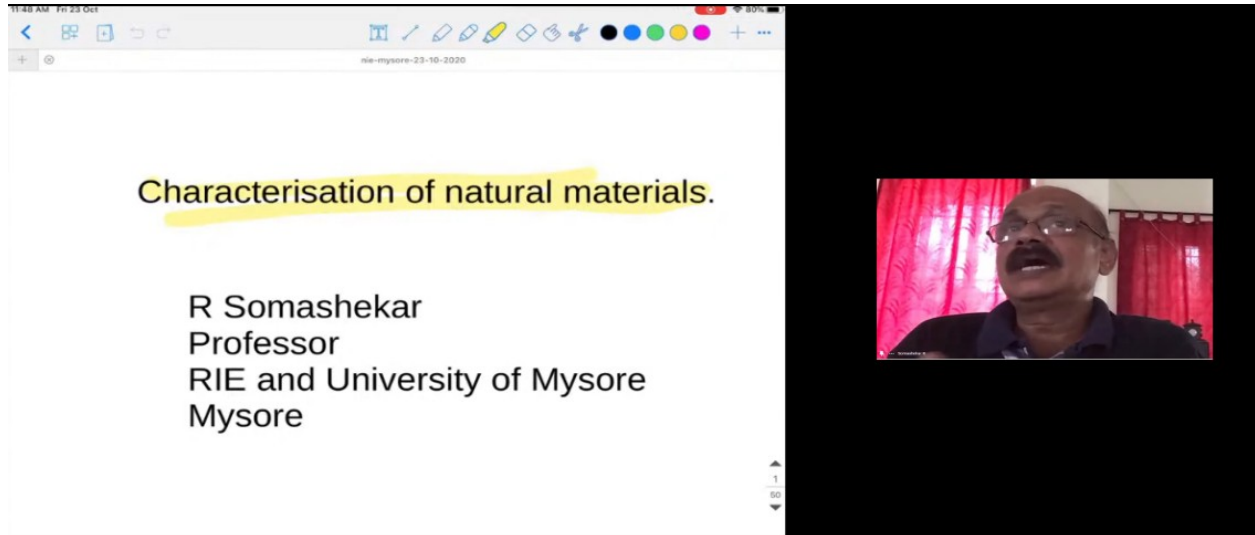
Day 5 (23/10/2020)

Session 1 was addressed by **Dr. G Umesh**, Professor of Physics (Retd), NITK Surathkal on "Metamaterials: Exotic Man-made Materials" who discussed about class of man made materials called metamaterials, where he described procedure and implication of making the permittivity and permeability negative value and cloaks applied in fighter aircrafts.



The image shows a presentation slide on the left and a video feed of Dr. G Umesh on the right. The slide has a white background with a colorful, abstract graphic of overlapping curved lines in shades of pink, purple, and green. The title "METAMATERIALS : EXOTIC MAN-MADE MATERIALS" is written in red, bold, uppercase letters. Below the title, the speaker's name and title are listed: "Dr.G.Umesh, Professor of Physics(Retd), N.I.T.K., Surathkal." and his email address "umesh52@gmail.com". At the bottom left, the date "October 23, 2020" is displayed. The video feed shows Dr. Umesh in a dark shirt, with his name "G. Umesh" displayed at the bottom of the frame.

Session 2 was addressed by **Dr. R Somashekar**, Professor (Retd) RIE and UOM, Mysuru on “Characterisation of natural materials” who discussed about X-ray diffraction techniques in structural determination of various types of fibers.



OUTCOME

All the sessions were very much informative. The discussed areas are of great benefit for the participants as the topics match with the current working domain. Participants were enlightened with the most widely used advance technologies in this domain. This in turn will help in research activities.