

REPORT OF THE LECTURE WORKSHOP ON
"TECHNO MATERIA 2014 - A CHEMICAL AND PHYSICAL PERSPECTIVE
OF TREND SETTING ENGINEERING MATERIALS"

SPONSORED BY

INDIAN NATIONAL SCIENCE ACADEMY, NEW DELHI

"INDIAN ACADEMY OF SCIENCES, BANGALORE

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NATIONAL ACADEMY OF SCIENCES INDIA, ALLAHABAD

ORGANIZED BY

DEPARTMENT OF CHEMISTRY AND DEPARTMENT OF PHYSICS

N.S.S. COLLEGE OF ENGINEERING, PALAKKAD

January 24-25, 2014

DAY 1 (24/01/2014)

The inaugural meeting was chaired by Professor K. R. Chandrasekhara Pillai, Principal, N. S. S. College, Palakkad. Dr. S. Mayadevi (Dept. of Chemistry and Convener of the programme) offered the welcome speech. The Workshop was inaugurated by Dr. K. R. Gopidas, Chief Scientist & Head, National Institute of Interdisciplinary Science and Technology, Thiruvananthapuram. Dr. Gopidas in his inaugural address explained the role of the all the three academies in the promotion of science education and research. He also has detailed the various programmes that the academy offers towards this end. Prof. Chandrasekhara Pillai in his presidential address acknowledged the academies which enabled the students of the college and nearby colleges to attend the lectures by eminent professors of various reputed institutes. Prof. K. L. Sebastian, Indian Institute of Science, Bangalore, has delivered the keynote address in which he emphasized the importance of basic sciences and detailed the various activities of the academy. He also talked about the various

academy journals and encouraged the students to read RESONANCE and other journals brought out by the academies. Dr. Manoj Rama Varma, (NIIST, Trivandrum) has also addressed the audience and he emphasized the inevitable role of science in Engineering education. Dr. P. R. Sreemahadevan Pillai (HOD, Civil Engineering), Dr. S. Sreenadhan (HOD, Instrumentation and Control Engineering), and Dr. Sindhu (HOD, Electrical and Electronics Engineering) delivered felicitations. Dr. R. Muraleedharan (HOD, Dept. of Physics) proposed vote of thanks.

Dr. K. R. Gopidas has talked briefly about the following

The objectives of the three National Science Academies: While upholding the cause of science in pure and applied branches they promote its advancement through various activities such as organizing programmes for teachers and students all over India.

The **monthly journal Resonance**, published since January 1996, carries articles in all areas of science and engineering. It is aimed generally at the undergraduate level, with some articles accessible at the 12th standard level and some at the Master's level.

Summer Fellowships are awarded to bright students and motivated teachers to work with eminent scientists on research-oriented projects in research institutions across the country. The main objective is to expose young students and teachers to the atmosphere of a research environment and to the pleasure of doing science. This programme has, in recent years, grown in size and prestige and is now regarded as a national programme contributing usefully to the improvement of science education in the country. In the year 2013, nearly 1500 such fellowships were availed by students and teachers with travel and living expenses paid. Announcements inviting applications appear in *Resonance* and *Current Science* around October–November, and the selected applicants, notified by February–March, can avail the fellowships for two months during the summer.

Refresher Courses for Teachers is an all India programme to help motivated teachers improve their background knowledge and teaching skills. The duration is two weeks and approximately 30 teachers selected from all over the country undergo a rigorous course of lectures, discussions, laboratory experiments, and problem-solving sessions.

Of the Courses held by the Academy, the ones on Experimental Physics have been the most active. The Academy has set up an Experimental Physics Laboratory in Bangalore where 5 to 6 Courses are regularly held per year. The Academy has also started holding Experimental Courses in Chemistry and Biology.

The Academy arranges **two or three-day lecture workshops** on carefully chosen topics in physics, mathematics, chemistry and life sciences at selected college and university departments for local students and teachers. Speakers include Fellows and scientists from nearby institutions. The Academy meets travel expenses of speakers, and the host institution provides hospitality and local expenses.

Over the years, with the help of its Fellowship, the Academy has built up a **database of teachers** from colleges and universities all over the country. Many teachers are invited to participate, as guests of the Academy, in its Midyear (July) and Annual (October–November) meetings.

This provides opportunities for teachers to attend scientific programmes, as well as to meet and interact with Fellows. Over the past decade, over 1000 teachers have attended Academy meetings.

Position Paper on “Restructuring Post–School Science Teaching Programmes”

The three national science academies of the country recently brought out a Position Paper on Post–School Science Teaching Programmes in October 2008. The Position Paper suggests introduction of a new composite 4–year BS degree at select centres apart from several other measures to improve science education in the country. A few universities and research institutions in the country have already started 4 year BS courses and some more are expected to start the course soon.

Scientific Sessions

Session 1 was chaired by Dr. P.R Sreemahadevan Pillai, HOD, Civil Engineering Dept. NSSCE, Palakkad. He introduced the speaker to the audience.

In this session **two** lectures were given by Prof. K. L. Sebastian (IISc, Bangalore). He has outlined the wave particle duality through the double slit experiment, uncertainty principle and stationary states etc. He has introduced the concept of path integrals through random walk model. The duration of the talk was from 10:15 am to 11.30 am and from 11.45 am to 1.00 pm.

Tea break from 11.15-11.30 am

Lunch break from 1.00pm to 2 pm

Session 2 was chaired by Dr. T. Sudha, Professor, Dept. of Electronics and Communication Eng. She introduced Dr. Manoj Rama Varma (NIIST, TVM) to the audience.

Dr. Manoj spoke about basic magnetism, magnetic interactions, magnetic frustrations, multiferroics, magnetodielectric properties of some double perovskites etc. Session was from 2 – 3.15 pm.

Tea break 3.15-3.30 pm

Session 3 was chaired by Prof. S. Sreenadhan. (HOD, IC Dept.). He introduced the speaker, Dr. K. R. Gopidas (NIIST, TVM) to the audience. Dr. Gopidas has talked about photovoltaics, design of silicon solar cells, organic solar cells, various types and applications of organic photovoltaics.

DAY 2(25th January-2014)

Session 4 was chaired by Dr. Devi, Professor, Dept of Electrical and Electronics Eng. She introduced the speaker Dr. Chandrabhas Narayana (JNCASR, Bangalore). Dr. Chandrabhas Narayana (9 am - 10:15 am) explained the interaction of radiation with matter. He explained how Raman spectroscopy can be used as a molecular fingerprinting, resonant Raman effect, the versatility of Raman spectroscopy in structural studies etc.

Session 5 was chaired by Dr. R. Muraleedharan, HOD, Dept. of Physics (10.15 am-11.30 am) and he introduced the speaker Dr. P.S. Anilkumar (IISc, Bangalore). The lecture was on spintronics. He detailed the concept of magneto resistance, spin valve effect, super paramagnetic limit, tunnel magneto resistance etc.

Tea break from 11.15-11.30

Session 6 (11.30 am-12.45 pm) was given by Dr. Chandrabhas Narayana on Materials under High Pressure. He explained how application of disturbance on materials by applying electric field, magnetic field, change in volume, change in temperature, change in pressure etc produces changes in properties. He introduced heat resistant compounds and how the high pressure in material synthesis lead to the discovery of industrially useful materials like BN3 etc.

Lunch break from 12.45pm to 1.45 pm

Session 7 started at 1.45 pm and chaired by Dr. Jyothy Parvathy, Dept. of Physics. Dr. P. S. Anilkumar was the speaker and he talked about Nanofabrication. He explained optical lithography, positive and negative photo resist, spintorque effect, the challenges we address in nano magnetism etc.

Tea break from 3. pm-3.15 pm

Session 8 (3.15 pm-4.30 pm) was delivered by Dr. Suresh Das, Director, National Institute of Interdisciplinary Science and Technology, Thiruvananthapuram. He was introduced by Dr. Jyothy Parvathy to the participants. Dr. Das described what are photo responsive systems, complex supra molecular assemblies, challenges in the design of artificial photo responsive systems, photo-switching of liquid crystalline systems, effect of photoisomerization on the pitch of chiral nematics, photoinduced phase transition and imaging,

Concluding Session

Vote of thanks by the Convener and Coordinator. Dr. Suresh Das and Dr. Manoj Rama Varma also attended the concluding session.

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Time table of the workshop

Day 1				
9-10 am Inauguration	10.15-11.30 am Lecture 1 Prof KLS	11.30-12.45 am Lecture 2 Prof KLS	1.45-3.00 pm Lecture 3 Dr. MRV	3-4.15 pm Lecture 4 Dr. KRG
Day2				
9-10.15 am Lecture 5 Prof. CBN	10.30-11.45 am Lecture 5 Dr. APS	11.45-1.00 pm Lecture 6 Dr. CBN	2.00-3.15 pm Lecture7 Dr. PSA	3.30-4.45 pm Lecture8 Dr. SD

KLS – K. L. Sebastian

MRV – Manoj Rama Varma

KRG – K. R. Gopidas

CBN – Chandrabhas Narayana

PSA – P. S. Anilkumar

SD – Suresh Das

LIST OF PARTICIPANTS

DEPT. OF MECHANICAL ENGINEERING

- 1 Hemanth Krishnan R
- 2 Hrithwik D Babu
- 3 Jithin S
- 4 Jithu Krishnan
- 5 Karthik S Raman
- 6 M.Subin
- 7 Muhamed Mirsab A
- 8 Mohammed Shabin
- 9 Nidhin Krishnan S
- 10 Rahul N P
- 11 Ramesh M R
- 12 Renjith.R
- 13 Rohith P R
- 14 Sandeep M
- 15 Shanuver Isniyakh T V
- 16 Sreeraj P R
- 17 Sujith V
- 18 Sukesh S
- 19 Suma Manohar K
- 20 Vaisakh R nambiar
- 21 Vishnu M Nair
- 22 Yadu Krishnan R
- 23 Anand j
- 24 Anoop krishnan
- 25 Askar basha

- 26 Arun raj v
- 27 Arun p
- 28 Abhijith T P
- 29 Anfin joshi
- 30 Anand M.p
- 31 Ananthu G
- 32 George Shinto franics
- 33 Abdul rasal M
- 34 Aishwarya
- 35 Anoop k
- 36 Arun Dev M
- 37 Akhil Babu
- 38 Aravind mohan
- 39 Anirudhan s
- 40 Fazil firoz

DEPT OF COMPUTER SCIENCE

- 41 Vishnu K
- 42 Mohammed shibily Ts
- 43 Nidhin Krishnan K
- 44 Mohammed Haris A
- 45 Harikrishnan R
- 46 Bineesh PB
- 47 Sachin
- 48 Abhishekh valsan

DEPT OF CIVIL ENGINEERING

- 49 Vismay Nair
- 50 Shihabudheen KK
- 51 Mohammed Afsal
- 52 Abhishekh
- 53 Noushida
- 54 Sherin Maria
- 55 Thasleema k
- 56 veena unnikrishnan
- 57 Thanseeha yasmin
- 58 Sreevalsam M
- 59 sandeep A.p
- 60 Amrutha balan
- 61 Asams M.A

DEPT OF ELECTRICAL AND ELECTRONICS ENGINEERING

- 62 Gowri Prasad S
- 63 Aleesha K.P
- 64 Anusha s
- 65 Ramarajan V.K
- 66 Praveen das
- 67 Vivek v
- 68 Unnikrishnan M
- 69 Vijay vasudevan
- 70 Neha Nair
- 71 Shilpa s nair

72 Lakshmi raj

73 Sharika k

DEPT OF INSTRUMENTATION AND CONTROL ENGINEERING

74 Govind s menon

75 Sanjay s

76 Vishnu Prasad M

77 Gopi Krishnan

78 Darshana

79 Sandra C

80 Uthra M J

81 Veena P.v

82 Rekha

83 Beegum saliha S

84 Narayanan

85 Adithyan s potty

86 Vineeth T

87 Hareesh .s

DEPT OF ELECTRONICS AND COMMUNICATION ENGINEERING

88 Farzana raziya

89 Aishwarya Anantharaman

90 Haripriya S

91 Bhavya lakshmi

92 Anagha

93 Arya

94 Anjali K

95 Jishnu K

96 Asif PA

97 Akhilesh AV

98 Anirudh KV

99 Febin jishal

100 Akash T.v

101 Alif shahul

102 Ajay n kutty

103 ashik ks

104 Aiswarya MA

105 Akshay Raveendran

106 Anjali v Sajeev

107 Anjana Krishna

108Anu s Balan

109 Danya Mohandas

110 Gopika Krishna s

111 Alifa

112 Geethika K V

113 Jesni AM

114 Anju cMohan

115 Anagha

116 Chaitra sree

117Aiswarya k

External Participants

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118	Anjaly T. R.	MTECH student	IIT Bombay
119	Vishal A.C.	Asst Prof.	Ahalia School Of Engg & Technology
	Thannasi	Asst Prof (Phy)	Ahalia School Of Engg&Technology
120	Megha M	Asst.Prof. (chem)	Ahalia SchoolOfEngg&Technology
121	Sunitha AP	Asst.Prof.(Phy)	Govt.VictoriaCollege, Palakkad
122	Divya D	Asst.Prof.(Phy)	Govt.VictoriaCollege, Palakkad
123	Shanthil M	Asst.Prof.(Chem)	Govt.VictoriaCollege, Palakkad
124	Dr.John P.R.	Asst.Prof. (Chem)	Govt.VictoriaCollege, palakkad
125	Dr.Padmakumar K	AAstt.Prof.(Chem)	Govt.victoria College, Palakkad
126	AmbilyKrishnan	Asst.Prof.(Phy)	Govt.VictoriaCollege, Palakkad
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128	Priya Varma C	Asst.Prof.(Phys)	Mercy College,Palakkad
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131	Dr.Santhi V	Asst Prof (Chem)	Govt.VictoriaCollege, Palakkad
132	Dr.M Lakshmi	Asst.Prof.(Phys)	Mercy College,Palakkad
133	Rajesh R	Asst.Prof.(Phys)	NSS College O, Nemmara, Palakkad
134	Harikrishnan AI	Asst.Prof.ECE	NSS College of Engg.Palakkad
135	Sumi M	Asst.Prof.ECE	NSS College of Engg.Palakkad
136	Alphonsa Joy	MSc (Chem)	Govt.Victiria College, Palakkad
137	Tency KS	MSc (Chem)	Govt.VictoriaCollege, Palakkad
138	MahimaMeriaPhilip	MSc (Chem)	Govt.VictoriaCollege, Palakkad
139	Geethu K	MSc (Chem)	Govt.VictoriaCollege, Palakkad
140	Anisha V	MSc (Chem)	Govt.VictoriaCollege, Palakkad

141	Keerthy KN	MSc (Chem)	Govt. Victoria College, Palakkad
142	Arifa PV	MSc (Chem)	Govt. Victoria College, Palakkad
143	Nimitha Krishnan K	MSc (Chem)	Govt. Victoria College, Palakkad
144	Deepthi PR	MSc (Chem)	Govt. Victoria College, Palakkad
145	Santhosh P	MSc (Chem)	Govt. Victoria College, Palakkad
146	Rijane H	MSc (Chem)	Govt. Victoria College, Palakkad
147	Anu MS	MSc (Phys)	Govt. Victoria College, Palakkad
148	Raji P	MSc (Phys)	Govt. Victoria College, Palakkad
149	Ranjith R	MSc (Phys)	Govt. Victoria College, Palakkad
150	Ajay J	MSc (Phys)	Govt., Victoria College, Palakkad
151	Arya C	MSc (Phys)	Govt. Victoria College, Palakkad

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