

REPORT
Science Academies' Lecture Workshop
On
Recent Trends in Nanoscience and Technology
7 – 9 September 2017
Sponsored by
INDIAN ACADEMY OF SCIENCES
BANGALORE
INDIAN NATIONAL SCIENCE ACADEMY THE NATIONAL ACADEMY OF SCIENCES
NEW DELHI ALLAHABAD
Organized by
Department of Chemistry and Department of Physics
CHRIST CHURCH COLLEGE, KANPUR



The Department of Chemistry and department of Physics organized a three-day Science Academies' Lecture Workshop on "Recent Trends in Nanoscience and Technology" with the financial support of the three Science Academies viz. Indian Academy of Sciences, Bangalore, Indian National Science Academy, New Delhi and The National Academy of Sciences, Allahabad.

Aim of the Workshop

The workshop intended to give a plethora of latest trends in various disciplines of Nanoscience and Technology to the students and College/University teachers. It also aimed to kindle the inquisitiveness of the young minds and orient them towards taking up higher studies in Nanosciences. The objective was to provide a platform for the interaction of students and faculty members with eminent academicians from leading research institutions in India.

Structure of the Workshop

Lectures by eminent scientists and teachers working in diverse research areas in Nanoscience and Technology were organized. Each lecture was of 75 minutes duration, including discussions and a total of twelve lectures (excluding the Inaugural & Valedictory Address) were delivered during the three days. A total of 150 participants from different institutions of Uttar Pradesh were benefitted by attending the workshop. The colleges include PPN College, BND College, AND College, VSSD College, DAV College, UPTTI, Harcourt Butler Technological University, M.P Govt. College, Hardoi, S.N SEN College, UIET, Saraswati Mahavidyalaya, Pratap University etc.

Prof. Sandeep Verma, FNAsc, Head, Sri Devraj Chair Professor, Department of Chemistry, IIT Kanpur was the Course Director. **Prof. R.K Dwivedi, Head, Department of Physics and Dr. Meet Kamal, Associate Professor, Department of Chemistry;** were the course coordinators from Physics and Chemistry, respectively. The Programme started with the Inaugural function, during which Dr. R.K Gupta, Principal, Christ Church College welcomed the Chief Guest, Prof. Eshwara Prasad, Director, DMSRDE, Kanpur. Prof. P.E. Deen, Secretary, College Governing body delivered the Presidential Address in which he asked the students to interact with the Resource persons and make maximum use of the opportunity. He also thanked the Academy for its generous support in making the funds available on time

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Prof. Eswara Prasad, Director DMSRDE, the chief guest of Inaugural function, highlighted the purpose and importance of organizing such academy sponsored Lecture Workshops. He appreciated the efforts of Christ Church College, Kanpur in organizing such workshops.

Prof. Sandeep Verma, FNAsc, Head, Sri Devraj Chair Professor, Department of Chemistry, IIT Kanpur, the Course Director in his inaugural keynote address, briefed the role of science academies in nurturing basic science. This was followed by the technical sessions.

The session I was given by Prof. Sandeep Verma, FNAsc, Head, Sri Devraj Chair Professor, Department of Chemistry, IIT Kanpur, the Course Director. He beautifully brought out the genesis of Bio-Medical Nanoscience and Technology, in particular Nanoscale systems in biological systems. He discussed about Nanoengineered polymer and amorphous carbon particles/capsules: Versatile drug carrier and bioimaging agents, importance of nitric oxide in the body to avoid cardiac arrests, DNA fractionation using surface electrophoresis on nano-patterned surfaces with different energy levels, Patterning of Proteins at Nanoscale. **The session II, was given by Dr. T.C. Shami, Scientist G, Additional Director, DMSRDE, Kanpur.**

He emphasized on nanomaterials for defence applications. He discussed about nano materials, conducting, magnetic, polymeric & carbon materials (CNT & Carbon micro-coil), green chemistry LASER and low emissivity materials & fabric-based camouflage products for stealth application in Defence. He shared his expertise in stealth material. This session was followed by lunch of the participants

Day 2 started with session by Professor Asima Pradhan, Department of Physics and CLET, IIT Kanpur. Prof. Pradhan discussed about Fluorescence based diagnostics of early cancer. She analyzed



about biomedical optics, which is a forefront research area and a rapidly developing field, mainly due to the growth in the field of lasers, fiber optics and associated technologies. Optical methods, due to their non-invasive nature, are providing novel approaches for medical imaging, diagnosis and therapy. Motivated by the fact that unlike conventional diagnostics techniques, spectroscopic measurements on human tissue may offer

noninvasive, nondestructive and near real time detection of diseases. The fluorescence spectroscopy, has particularly been investigated for diagnosis of cancer, taking advantage of the native fluorescence from tissue components, such as proteins and enzymes and their subtle changes during progress of diseases. The discussion was highly informative.

The session III and session IV were delivered by Prof. Debrata Goswami. Prof. Goswami gave an insight on introduction to nanoscience and nanotechnology. His first lecture in session III was discussion on history and fundamentals of nanomaterials. His second lecture in IV session was on optical coding and control at nanoscale. He discussed, how using Femtosecond Lasers, the molecular control and decoherence which will give rise to all kinds of effects which can have implications to various fundamental as well as applied areas of research including biomedical areas. He emphasized towards a direction where he is going to mix the temporal part with spatial part. In his research, he discussed about a tweezer which is pulsed in time. So, he is trying to impart time and space simultaneously. **Prof. Pradhan, gave her second lecture in session 6 on Raman spectroscopy on Cancer diagnostics.** The advantage offered by Raman technique is that Raman spectra of most bio-molecules show much sharper and distinctive spectral features that can be used for a more specific finger printing of the changes in structure and environment of the bio-molecules participating in disease. This is therefore expected to complement fluorescence spectroscopy and the combination of the two may lead to improved diagnosis. She also has designed a device which could detect oral cancer easily. The session was followed by lunch.

**Dr. Lipika Ray, DST – SERB Young Scientist,
Pharmaceutics Division
CSIR – Central Drug Research Institute**



(CDRI), Lucknow, gave the lecture during 7 on “Introduction to Nanomedicine”. She told the fundamental principles of nanomedicine, their formulation on tissue cells and its therapeutic. The session was highly interactive

**In session VIII, Dr. Lipika Ray, DST – SERB Young Scientist, Pharmaceutics Division
CSIR – Central Drug Research Institute**

(CDRI), Lucknow, gave an insight into Nanoparticle based targeted drug delivery. She discussed about Doxorubicin (DOX), which is a well-known anticancer drug used for the treatment of a wide variety of cancers. She hypothesized that by encapsulating the drug in biodegradable polymeric nanoparticles, its therapeutic efficacy would improve, if targeted against cancer cells. She also told the benefits of curcumin present in turmeric as a bleaching agent for skin. The anticancer properties of selenium (Se) and curcumin nanoparticles in solo formulations as well as in combination with other therapeutic agents have been proved time and again.
09.09.2017

Day 3, the Resource Person for session IXth and Xth was Prof. S. Siva Kumar, Associate Professor, Department of Chemical Engineering, IIT Kanpur. He gave an inspirational talk on the Nanoparticle synthesis, in his first lecture and applications of Nanomaterials. In his second lecture he explored mainly on nanolithography, nano sensors, nano-drug delivery, sustainable energy materials and systems, nano adhesives, functional polymers, self-assembly, nanowires, nano carbon materials, nanocomposites, carbon MEMS, nano catalyst, nano soft materials, nanotribology, lab on chips, nano phosphorous and nano mechanics.



The last XIth and XIIth session of Day 3 was given by DR. Prabhat Dwivedi, Senior Scientist Officer, Thematic Unit of Excellence, IIT Kanpur on Fabrication of Nano Structures. Both sessions were highly interactive. **The programme ended with the valedictory session whose chief guest was Dr. Narendra Mohan Agarwal, Director, National Sugar Institute, Kanpur.** He appreciated the efforts of both department of Chemistry and Physics.

The whole three-day lecture-workshop went on very well with all the resource persons taking sincere efforts to make the participants understand the various concepts starting from the essentials to their applications. There were more than 150 participants who attended the workshop. The participants gained a good insight into the Emerging Trends in Nanosciences.

This three-day lecture workshop was a revelation to many students for planning their career.

Dr Meet kamal

(Dr Meet kamal)
Course Coordinator, Chemistry

Dr R.K Dwivedi

(Dr R.K Dwivedi)
Course Coordinator, Physics

Science Academies' Lecture Workshop on Recent Trends in Nanoscience and Technology

List of Participants (Faculty)

S.No.	Name	Subject	Institution
1	Dr. Anil Kumar Awasthi	Chemistry	DAV College, Kanpur
2	Dr. Devendra Pratap Rao	Chemistry	DAV College, Kanpur
3	Dr. Abha Singh	Chemistry	DAV College, Kanpur
4	Dr. Anita Srivastava	Chemistry	DAV College, Kanpur
5	Dr. Chandan Prasad	Chemistry	DAV College, Kanpur
6	Dr. S.S. Kalra	Chemistry	DAV College, Kanpur
7	Dr. Amar Srivastava	Chemistry	DAV College, Kanpur
8	Dr. Sanjay Asthana	Chemistry	DAV College, Kanpur
9	Dr. Sunil Kumar Misra	Chemistry	DAV College, Kanpur
10	Dr. Sudhir Kumar Srivastava	Chemistry	DAV College, Kanpur
11	Dr. Rohit Mohan	Chemistry	DAV College, Kanpur
12	Dr. Sunil Kumar Mishra	Chemistry	DAV College, Kanpur
13	Dr. Saumya Saxena	Chemistry	DAV College, Kanpur
14	Dr. Monika Agarwal	Chemistry	DAV College, Kanpur
15	Dr. Avadesh Singh	Chemistry	DAV College, Kanpur
16	Dr. Udai Pratap Singh	Chemistry	DAV College, Kanpur
17	Dr. Sandhya Srivastava	Chemistry	DAV College, Kanpur
18	Dr. Vinita Srivastava	Chemistry	DAV College, Kanpur
19	Dr. Ashok Kumar Srivastava	Chemistry	DBS College, Kanpur
20	Dr. Anjali Nigam	Chemistry	DBS College, Kanpur
21	Dr. Rajesh Shukla	Chemistry	DBS College, Kanpur
22	Dr. Sanjay Kumar Singh	Chemistry	DBS College, Kanpur
23	Dr. Vivek Kumar Pandey	Chemistry	DBS College, Kanpur
24	Dr. Praveen Kumar Srivastava	Chemistry	DBS College, Kanpur
25	Dr. Rajiv Agrawal	Chemistry	DBS College, Kanpur
26	Dr. Narayan Pratap Singh	Chemistry	DBS College, Kanpur
27	Dr. Shailendra Kumar Shukla	Chemistry	DBS College, Kanpur
28	Dr. Alka Dixit	Chemistry	DBS College, Kanpur
29	Dr. Kailash Bhargava	Chemistry	DBS College, Kanpur
30	Dr. Sudhir Tripathi	Chemistry	DBS College, Kanpur
31	Dr. Chandraprakash Singh	Chemistry	DBS College, Kanpur
32	Dr. Seema Tripathi	Chemistry	DBS College, Kanpur
33	Dr. Sapna Shukla	Chemistry	DBS College, Kanpur
34	Dr. Shalini Pandey	Chemistry	DBS College, Kanpur
35	Dr. Archana Saxena	Chemistry	DBS College, Kanpur
36	Dr. Chandra Mohan Saxena	Chemistry	DBS College, Kanpur
37	Dr. Tripti Bisaria	Chemistry	DBS College, Kanpur
38	Dr. Tamanna Begum	Chemistry	DBS College, Kanpur
39	Dr. Pankaj Shukla	Chemistry	DBS College, Kanpur
40	Dr. Suman Katiyar	Chemistry	DBS College, Kanpur
41	Dr. Pankaj Kr Srivastava	Chemistry	DBS College, Kanpur
42	Dr. Ashok Misra	Chemistry	DBS College, Kanpur
43	Dr. Kalpana Vajpeyi	Chemistry	DBS College, Kanpur
44	Dr. Anjali Misra	Chemistry	DBS College, Kanpur
45	Dr. Nand Lal	Chemistry	VSSD College Kanpur
46	Dr. Sandeep Kr. Singh	Chemistry	VSSD College Kanpur
47	Dr. Kiran Singh	Chemistry	VSSD College Kanpur

48	Dr. Shalini Dwivedi	Chemistry	VSSD College Kanpur
49	Dr. Anuradha Tiwari	Chemistry	VSSD College Kanpur
50	Dr. Neelam Pal	Chemistry	VSSD College Kanpur
51	Dr. Santosh Kumar Tripathi	Chemistry	VSSD College Kanpur
52	Dr. Kavita Srivastava	Chemistry	VSSD College Kanpur
53	Dr. Vikas Singh Gangwar	Chemistry	VSSD College Kanpur
54	Dr. Gyan Prakash	Chemistry	VSSD College Kanpur
55	Dr. Ashish Kr. Singh	Chemistry	VSSD College Kanpur
56	Dr. Harsh Kumar Garg	Chemistry	DV PG Collegekanpur
57	Dr. Sudhir Gupta	Chemistry	Christ Church College kanpur
58	Dr. Joseph Daniel	Chemistry	Christ Church College kanpur
59	Dr. Jyotsna Lal	Chemistry	Christ Church College kanpur
60	Dr. Meet Kamal	Chemistry	Christ Church College kanpur
61	Dr. Shweta Chand	Chemistry	Christ Church College kanpur
62	Dr. Anindita Bhattacharya	Chemistry	Christ Church College kanpur
63	Dr. Asim Kumar Nathaniel	Chemistry	Christ Church College kanpur
64	Yousuf Akhtar Roomi	Chemistry	BND College kanpur
65	Akshay Kumar Shukla	Chemistry	BND College kanpur
66	Dr. Jiya Lal Maurya	Chemistry	BND College kanpur
67	Dr. Rita Awasthi	Chemistry	BND College kanpur
68	Dr. Renu Rastogi	Chemistry	BND College kanpur
69	Deepshika	Chemistry	BND College kanpur
70	Susmita Bajpai	Chemistry	BND College kanpur
71	Alka Gupta	Chemistry	BND College kanpur
72	Dr. Sumitra Maurya	Chemistry	BND College kanpur
73	Dr. Archana Pandey	Chemistry	BND College kanpur
74	Dr. Alka Tangiri	Chemistry	BND College kanpur
75	Dr. Neeru Nigam Sikoria	Chemistry	Saraswati Mahila Mahavidyalaya,kanpur
76	Dr. Vijailaxmi	Chemistry	Shaheed Bhagat Singh PG College Kanpur
77	Dr. Mishu Singh	Chemistry	MP Govt . PG College Hardoi
78	Shaili Sachan	Industrial Chemistry	Brahmanand College, Kanpur
79	Dr. Manjari Gupta	Industrial Chemistry	Brahmanand College, Kanpur
80	Dr. Anokhe Lal Pathak	Mathematics	Brahmanand College, Kanpur
81	Satya Narain Misra	Mathematics	Brahmanand College, Kanpur
82	Dr. Archana Dixit	Chemistry	DG College,kanpur
83	Dr. Shashi Agarwal	Chemistry	DG College,kanpur
84	Dr. Alka Srivastava	Chemistry	DG College,kanpur
85	Dr. Rachna Prakash Srivastava	Chemistry	DG College,kanpur
86	Dr. Devendra Prasad	Physics	UPTTI kanpur
87	Dr. Vikram Singh	Physics	Agra College, Agra
88	Dr. Brijendra Kumar Sharma	Physics	Agra College, Agra
89	Dr. Gaurang Misra	Physics	Agra College, Agra
90	Dr. Pawan Srivastava	Physics	DSN College, Unnao
91	Dr. Akansha Srivastava	Physics	DSN College, Unnao
92	Neelu Kambo	Chemistry	UPTTI kanpur
93	Govind Prasad	Chemistry	UPTTI kanpur
94	Dr. Alok Kumar Srivastav	Chemistry	DBS College kanpur
95	Dr. Indrani Dubey	Zoology	DBS College kanpur
96	Dr. Ashutosh Dwivedi	Physics	Pratap University, Jaipur
97	Dr. Ramshabd Yadav	Physics	DAV College, Kanpur

98	Dr. Ravi Prakash Mahalwala	Physics	Christ Church College, Kanpur
99	Dr. Satya Prakash Singh	Physics	Christ Church College, Kanpur
100	Dr. Manish Kapoor	Physics	Christ Church College, Kanpur
101	Dr. Vivek Dwivedi	Physics	Brahmanand College, Kanpur
102	Dr. A. K. Agnihotri	Physics	Brahmanand College, Kanpur
103	Dr. Arvind Pandey	Physics	Brahmanand College, Kanpur
104	Dr. Sunil Singh Bhadouria	Physics	Brahmanand College, Kanpur
105	Dr. Vipaty Kumar Katiyar	Physics	Brahmanand College, Kanpur
106	Dr. Navneet Kumar Mishra	Physics	Brahmanand College, Kanpur
107	Dr. Mahendra Singh Yadav	Physics	Brahmanand College, Kanpur

List of Participants (Students)

1	Shubham Saini	Physics	DAV College, Kanpur
2	Kajal Kushwaha	Physics	DAV College, Kanpur
3	Rishab Gupta	Physics	DAV College, Kanpur
4	Pallavi Verma	Physics	DAV College, Kanpur
5	Lakshya Trivedi	Physics	DAV College, Kanpur
6	Mohit Kashyap	Physics	DAV College, Kanpur
7	Himanshu Srivastava	Physics	DAV College, Kanpur
8	Rohit Verma	Physics	DAV College, Kanpur
9	Pramod Kumar	Physics	DAV College, Kanpur
10	Naresh Kumar Mishra	Physics	DAV College, Kanpur
11	Sachin Dev	Physics	DAV College, Kanpur
12	Divya Gupta	Physics	PPN College, Kanpur
13	Harshita Dubey	Physics	PPN College, Kanpur
14	Kajal Katiyar	Physics	PPN College, Kanpur
15	Prakhar Mishra	Physics	PPN College, Kanpur
16	Jyoti	Physics	PPN College, Kanpur
17	Adya Shukla	Physics	PPN College, Kanpur
18	Zainab Khan	Physics	PPN College, Kanpur
19	Aditi Kapoor	Physics	PPN College, Kanpur
20	Fatima Bano	Physics	PPN College, Kanpur
21	Sonal Mishra	Physics	PPN College, Kanpur
22	Indresh Singh	Physics	PPN College, Kanpur
23	Harsh Kumar	Physics	Christ Church College, Kanpur
24	Rajat Sachdev	Physics	Christ Church College, Kanpur
25	Shalini Gautam	Physics	Christ Church College, Kanpur
26	Namra sarfaraz	Physics	Christ Church College, Kanpur
27	Vikas Singh	Physics	Christ Church College, Kanpur
28	Animesh Tiwari	Physics	Christ Church College, Kanpur
29	Mohd. Mubashir	Physics	Christ Church College, Kanpur
30	Priya Porwal	Physics	Christ Church College, Kanpur
31	Ankit Philip Anderson	Physics	Christ Church College, Kanpur
32	Gausia Qamar Fatima	Physics	Christ Church College, Kanpur
33	Anjali Biswas	Physics	Christ Church College, Kanpur
34	Shahani Naaz	Physics	Christ Church College, Kanpur
35	Shalini Kushwaha	Physics	Christ Church College, Kanpur
36	Mitesh Shakya	Physics	Christ Church College, Kanpur
37	Shubham Chaurasia	Physics	Christ Church College, Kanpur
38	Shobhit Dubey	Physics	Christ Church College, Kanpur

39	Satyam Agnihotri	Physics	Christ Church College, Kanpur
40	Vandana Tripathi	Botany	Christ Church College, Kanpur
41	Shivam Kumar	Botany	Christ Church College, Kanpur
42	Sushil Agrahari	Botany	Christ Church College, Kanpur
43	Akhil Singh	Botany	Christ Church College, Kanpur
44	Vipin Dubey	Botany	Christ Church College, Kanpur
45	Saumya Shukla	Botany	Christ Church College, Kanpur
46	Neha Gupta	Botany	Christ Church College, Kanpur
47	Iti Tandon (student)	Chemistry	DAV College, Kanpur
48	Anuva Chatterjee	Chemistry	DAV College, Kanpur
49	Kriti Yadav	Chemistry	DAV College, Kanpur
50	Pooja Mishra	Chemistry	DAV College, Kanpur
51	Shweta Tripathi	Chemistry	DAV College, Kanpur
52	Kritika Gupta	Chemistry	DAV College, Kanpur
53	Himanshu Kumar	Chemistry	DAV College, Kanpur
54	Brijesh Kumar	Chemistry	DAV College, Kanpur
55	Shafiya Rasheed	Chemistry	DAV College, Kanpur
56	Karan Singh	Chemistry	DAV College, Kanpur
57	Varah Fatima	Chemistry	DAV College, Kanpur
58	Guneet Kaur	Chemistry	DAV College, Kanpur
59	Ashima Lal	Chemistry	DAV College, Kanpur
60	Sonam Shukla	Chemistry	DAV College, Kanpur
61	Neha Kumari	Chemistry	DAV College, Kanpur
62	Mohd. Ayaz	Chemistry	DAV College, Kanpur
63	Manisha Rani Paul	Chemistry	DG College Kanpur
64	Purnima Singh	Chemistry	DG College Kanpur
65	Divyanshi Awasthi	Chemistry	DG College Kanpur
66	Shruti Kapoor	Chemistry	DG College Kanpur
67	Anjali Gupta	Chemistry	DG College Kanpur
68	Taiyaba Gul	Chemistry	DG College Kanpur
69	Prakansha Singh	Chemistry	DBS College kanpur
70	Manish Patel	Chemistry	DBS College kanpur
71	Amrita Singh Rajput	Chemistry	DBS College kanpur
72	Alankriti Tiwari	Chemistry	DBS College kanpur
73	Pramila Singh	Chemistry	DBS College kanpur
74	Krati Pandey	Physics	DBS College kanpur