



HSNC UNIVERSITY, MUMBAI KISHINCHAND CHELLARAM COLLEGE

Department of Life sciences
In Collaboration With
IQAC, Institute of Science, Mumbai
Under the aegis of DBT Star Status

presents

"Nanoparticle Synthesis and Analysis"

Date : 26th March, 2022

Time: 9:30 am to 4:30 pm

Resource people: Dr. Rajesh Raut, Mr. Gaurav Bingi

The Department of Life Sciences, in collaboration with the IQAC, Institute of Science, Mumbai held a hands-on workshop on "Nanoparticle Synthesis and Analysis" on Saturday, the 26th of March, 2022.

The morning session was conducted in the Life Sciences Laboratory, K.C. College, while the venue for the Afternoon session was the Institute of Science.

The students of Second Year B.Sc. and Third Year B.Sc. Life Sciences batch, K.C. College, were joined by the students of M.Sc. and Ph.D, IQAC, Institute of Science for the workshop.

Morning session

Dr. Sagarika Damle, Head of the Department of Life Sciences, inaugurated the morning session by welcoming the participants and introducing the speakers and resource people - Mr. Gaurav Bingi and Dr. Rajesh Raut.

After the opening remarks by Dr. Aashu Vajpai, Departmental Coordinator, DBT Star Status, Dr. Tejashree Shanbhag, Vice Principal of the Sciences, welcomed the teachers and students who were in attendance from the Institute of Science, Mumbai along with the students of K.C. College, then outlined the importance and applications of nanoparticles in today's world.

Mr. Gaurav Bingi then began with the workshop by illustrating the size of nanoparticles. How they are tinier than the diameter of a hair strand and equal to half the length of DNA. He then proceeded to outline the history of these particles and their unique properties.

Then came the crux of the workshop- Synthesis of nanotechnology. Mr. Bingi explained the two methods that are used to synthesize nanoparticles: the Top-Down method and the Bottom-Up method. It was emphasized that while the synthesis of the particles is an easy task, optimization of these is difficult.

After this, Mr. Gaurav enlisted the terms that are commonly used in the nanoparticle world and explained the limitations of these particles that can be toxic to the environment and difficult to degrade due to their miniscule size.

Mr. Bingi then went on to illustrate the techniques employed for nanoparticle characterisation based on their size, size distribution, surface functionality, porosity, and so on.

For size estimation, one can make use of the Atomic Force Microscope, Scanning Electron Microscope (SEM) or Transmission Electron microscope (TEM). Other approaches include spectrophotometry and Nanoparticle Tracking Analysis (NTA). To ascertain the surface functionality, the poly disparity index, which is the ratio of the weight average and the number average molecular masses is used.

The Fourier Transform Infrared (FTIR) is a device utilised in infrared spectroscopy and can be employed to determine the surface functionality of nanoparticles, too.

This device can also be applied in areas like sunlight harvesting and diagnosis of cancer.

With the talk wrapped up, the practical part of the workshop was set into motion with an explanation on the modus operandi by Dr. Mayuresh Joshi and Mr. Gaurav Bingi. The audience was instructed on the workings behind the process and the precautions to be followed to successfully carry the experiment out.

The participants were divided into groups, and provided with plant extracts, that had been prepared beforehand by volunteers, from which nanoparticles would be synthesised using the Bottom-Up method previously as elucidated by Mr. Gaurav Bingi.

Afternoon Session

After the brief practical, everyone in attendance were asked to reconvene at 2 pm at the Institute of Science where the afternoon session of the workshop would take place.

In batches, the participants observed Dr. Rajesh Raut, Assistant Professor, Department of Botany, use the LM20 by NanoSight's Technology to characterise pre-synthesised nanoparticle samples.

Characterisation is an important part of the process as it gives one insight into the nature of the to be studied.

The LM20 uses an infrared laser to track and visualise nanoparticles using the Stokes-Einstein equation. The particles being examined refract the laser beam which gives an idea on the shape, size and even other parameters such as viscosity and temperature of the material the particles are suspended into.

With the help of videos and a live tutorial on how to load the sample, the viewers were able to grasp how the instrument should be handled and applied.

At the end of the demonstration, Dr. Raut welcomed questions and patiently answered them.

With efforts of the Department of Life Sciences, K.C. College and the IQAC, Institute of Science, everyone in attendance was able to have a successfully enlightening session on a topic that is gaining relevance everyday.



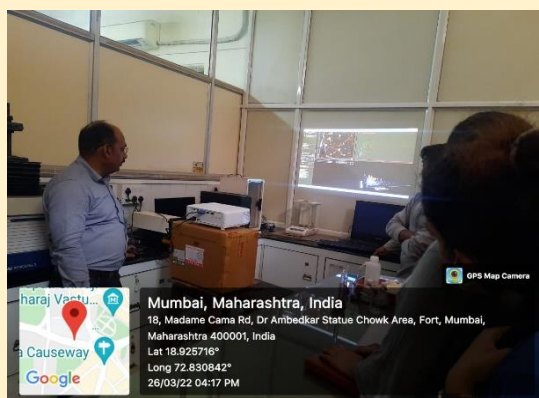
Morning session at K.C. College



Plant extracts provided to the attendees



Mr. Gaurav Bingi explaining
about nanoparticles



Dr. Raut demonstrating
how to use the LM20

Organising Committee:

Teachers in charge:

Dr. Sagarika Damle,

Head of the Department of Life Sciences

Coordinator, DBT Star Status, K.C. College

Dr. Aashu Vajpai,

Departmental Coordinator, DBT Star Status,

Department of Life Sciences, K.C. College

Student Volunteers:

Kelly Nigrel

Anam Shaikh

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