



**SITARAMBHAI NARANJI PATEL**  
INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE,UMRAKH  
(Managed by Vidyabharti Trust Institution)

A Vidyabharti Trust Institution  
Vidyabharti Campus, At. Ta. Bardoli, Dist. Surat-  
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**S N Patel Institute of Technology & Research Centre, Umrah**

## **DST GUJCOST SPONSORED**

**Online 5 days Short Term Training Programme on**

### **“Nanotechnology: Materials, Characterization, Synthesis and Applications”**

**(06-10 September, 2021)**



**Organized by Mechanical Engineering Department  
S. N. Patel Institute of Technology & Research Centre, Umrah**



**Sponsored by  
Department of Science and Technology (GUJCOST), Gandhinagar**

**Report Prepared by:**

**Dr. Arif M. Varsi**

**Event Co-ordinator**

**Assistant Professor,**

**Mechanical Engineering Department**

**S. N. Patel Institute of Technology & Research Centre,  
Umrah**



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**S N Patel Institute of Technology & Research Centre, Umrakh**

**TITLE OF EVENT**

**“Nanotechnology: Materials, Characterization, Synthesis and Applications”**

**CATEGORY**

**Academic Activity-STTP**

**Date and Duration**

**6<sup>th</sup> -10<sup>th</sup> September, 2021**

**VENUE**

**(Online Mode)**

**S N Patel Institute of Technology & Research Centre,  
Umrakh (049)**



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## S N Patel Institute of Technology & Research Centre, Umrah

### Banner for the Event:

**SITARAMBHAI NARANJI PATEL INSTITUTE OF TECHNOLOGY & RESEARCH CENTRE, UMRAKH**  
 (A Vidyabharti Trust Institution)

**Mechanical Engineering Department**  
**Organizes**  
**Five days STTP**  
**on**

**Last Date for Application**  
**31/08/2021**

**Nanotechnology: Materials, Characterization, Synthesis and Applications**

**Principal**  
Dr. Piyush S. Jain

**Coordinators**  
Dr. Arif Varsi  
Prof. Vishal Dhimmarr

**Committee Members**  
Prof. Milan Patel  
Prof. Hiren Tamboli  
Prof. Chirag Chaudhari  
Prof. Rinkesh Patel

**(6<sup>th</sup> – 10<sup>th</sup> September, 2021)**

**SPONSORED BY**

Department of Science & Technology  
Government of Gujarat

**To Register click on**  
<https://forms.gle/GpxiZjH6Gp9Vhbwc9>  
**OR Scan**

**At & Po Baben, Ta.: Bardoli , Dist.: Surat, Pin: 394601**

### Event Details:

Event Name	Nanotechnology: Materials, Characterization, Synthesis and Applications
Date	06-10 September, 2021
Participants	103, UG-PG Students, Faculty Members, Researchers
Venue	Online Platform (Google Meet)
Funding Support	GUJCOST, Department of Science & Technology
Principal	Dr. Piyush S Jain
Event Coordinator	Dr. Arif M. Varsi, Assistant Professor, MED
	Dr. Shakil Kagzi, Associate Professor, MED
	Prof. Vishal Dhimmarr, Assistant Professor & I/c. Head, MED



## S N Patel Institute of Technology & Research Centre, Umrah

### Detailed Program Schedule

<b>6<sup>th</sup> September 2021</b>		
<b>Inauguration</b>		
<b>Time</b>	<b>Theme</b>	
09.30 am - 10.00 am	<b>Inauguration</b>	
10:00 am -11:30 am	Nano Composites	Dr. A. A. Shaikh Professor, SVNIT, Surat
11:45 am – 1:15 pm	Nano Science and Nanotechnology for sustainable development	Dr. Jignasa Gohel Associate Professor, Chemical Dept., SVNIT, Surat
2:00 pm – 3:30 pm	Nano-coatings and its application	Dr. Kamlesh Chauhan Associate Professor, Mechanical Dept, Charusat
<b>Time</b>	<b>Theme</b>	
<b>7<sup>th</sup> September 2021</b>		
10:00 am -11:30 am	Novel Nano Materials, Characterization and uses for Energy Sector	Dr. Jignasa Gohel Associate Professor, Chemical Dept., SVNIT, Surat
11:45 am – 1:15 pm	Graphene based nano materials for wastewater treatment	Dr. Rishi Kant Project Scientist, IIT Kanpur
2:00 pm – 3:30 pm	Nano-Materials	Dr. Chandrabhushan Pal Assistant Professor, Chemical Dept, SNPITRC

<b>Time</b>	<b>Theme</b>	
<b>8<sup>th</sup> September 2021</b>		
10:00 am -11:30 am	Nano finishing	Dr. Ajay M. Sidpara Associate Professor, IIT Kharagpur
11:45 am – 1:15 pm	Synthesis of carbon based materials for biomedical applications	Dr. Rishi Kant Project Scientist, IIT Kanpur
2:00 pm – 3:30 pm	Methods for surface modifications	Dr. Shakil Kagzi Associate Professor, Mechanical Dept, SNPITRC

<b>Time</b>	<b>Theme</b>	
<b>9<sup>th</sup> September 2021</b>		
10:00 am -11:30 am	Nanotechnology in pharmaceutical drug delivery system	Dr. D. M. Patel Associate Professor, Graduate School of Pharmacy, GTU drdmpatel1971@gmail.com
11:45 am – 1:15 pm	Nanoencapsulation of Bioactive Compounds: Methods, Challenges and Future Perspectives	Dr. S. K. Sundar Assistant Professor, SVNIT, Surat
2:00 pm – 3:30 pm	Nano-fluids	Dr. Nirav Patel Assistant Professor, Mechanical Dept, SNPITRC



## S N Patel Institute of Technology & Research Centre, Umrahk

Time	Theme	
	10th September 2021	
10:00 am -11:30 am	Nano Technology in Catalysis	Dr. Sanjay Srivastava Assistant Professor, Chemical Dept., GEC Valsad
11:45 am – 1:15 pm	Carbon based nano materials for solar energy application	Dr. Rishi Kant Project Scientist, IIT Kanpur
2:00 pm – 3:30 pm	Technical Quiz and Valedictory	Dr. Shakil Kagzi Associate Professor, Mechanical Dept, SNPITRC

Vidyabharti Trust is the name associated with the education for more than three decades near Bardoli of Surat district and has now evolved as a symbol of quality education dedicated to nurture the talent and aspirations of the bright youth of our nation. S N Patel Institute of Technology & Research Centre (Degree College) is a premier institution approved by the All-India Council of Technical Education (AICTE), New Delhi & affiliated with Gujarat Technological University (GTU, Ahmedabad).

Institute is running Bachelor of Mechanical Engineering course since 2008 having the current Intake of 120 seats and Post Graduate (M.E) program since 2014 with 24 seats. The prime goal of the department is to bridge the gap between rapidly expanding technology demands with innovation, research-based by using skilled/quality conscious approach to achieve an admirable grip in the academic field of mechanical engineering. The Mechanical department is having state of art laboratory facilities with Vertical Machining Centre (PX-20).

Department of Science & Technology (DST) has been constituted vide General Administration Department G.R.No.DST/2002/398/ITD dated 21st June, 2002 and it has been operational since 01.04.2003. This department mainly looks after the growth and development of new & emerging technology areas and is responsible for formulation and implementation of key policies in this sector in the State of Gujarat. As of now, DST has been looking after the various areas of technology in the State.

Mechanical Engineering Department of S. N. Patel Institute of Technology and Research Center (SNPITRC), Umrahk, organized five days online short term training program entitled as “Nano-Technology: Materials, Synthesis, Characterization and application”. This training program is under the motivation to impart some part pertaining to the syllabus on subject of Nanotechnology and Surface engineering as well as much more beyond than usual syllabus in terms of case studies and applications. Along with parent institute we would be having five speakers from IITs, NITs, GECs and other universities to discuss the many areas and current trends in nanotechnology.



## S N Patel Institute of Technology & Research Centre, Umrah

The program started on 6th September 2021 till 10th September 2021, with three sessions per day. An online test was scheduled at the end of the program and the participants were certified based on the attendance and online test.

On the Day one, after the welcome and introductory speech given by Dr. Shakil Kagzi, and introduction of the SPITRC, Umrah given by Dr. Piyush S. Jain, Principal, the session was handed over to Dr A A Shaikh, Professor, Mechanical Engineering Department, SVNIT-Surat. In this session an introduction to nano-composites its synthesis and application was provided. The research in nano-composited were also discussed.

The second session was taken by Dr. Jignasa Gohel, Associate Professor, Mechanical Engineering Department, SVNIT-Surat, in which she discussed application of Nano-Science and Technology and various disciplines including environment, green manufacturing and a sustainable development. She emphasized towards the research in recycling of Nano-waste.

The third session was taken of two different non-coating techniques by Dr. Kalpesh Chauhan from Mechanical Engineering Department, CHARUSAT-Anand. Main focused was maintained on the application of coating including automobile and industrial sector. The application of hydrophilic and hydrophobic surfaces was discussed in detail.

On the day Two, the first session was taken by Dr. Jignasa Gohel, Associate Professor, Mechanical Engineering Department, SVNIT-Surat, in which utilization nano-material in renewable energy sources was discussed. Mainly different research areas in renewable resources were discussed. The second session was delivered by Rishi Kant, Project Scientist, IIT Kanpur on the use of Nano-particles in waste water treatment. Particularly discussion was made on using Graphene particles to separate degrade material from waste water to purify it. The next session was followed by Dr. Chandrabhusan Pal, Assistant Professor, SNPITRC in which the methods of characterization of nano-particles were discussed.

On the day Three, the first session was conducted by Dr Ajay Sidpara, Associate Professor, Mechanical Engineering Department, IIT Kharagpur, discussed a detailed session on “Nanofinishing”.

The second session was conducted by Dr. Kagzi Shakil, Associate Professor, S N Patel Institute of Technology and Research Center, Umrah had taken session on the “Newest method of the surface Modification.”



## S N Patel Institute of Technology & Research Centre, Umrakh

On day Four, the first session was taken by Dr. D. M. Patel, Associate Professor, Graduate School of Pharmacy, on "Nanotechnology in pharmaceutical drug delivery system", Which is an application of nanotechnology beyond engineering. Second session was taken by Dr. S. K. Sundar., Assistant Professor, S. V. National Institute of Technology, Surat, on the “Nanoencapsulation of bioactive compounds: Methods, Challenges and Future Perspective.” Third session was handled by Dr Nirav Patel, Assistant Professor, Mechanical Engineering Department, SNPIT and RC, Umrakh with a topic on “Nanofluids”.

On day Five, the first session was taken by Dr. S. K. Srivastava, Assistant Professor, Government Engineering College, Valsad, on "Nanotechnology in catalysis". Second session was taken by Dr Rishi Kant, Project Scientist, IIT Kanpur, and delivered a topic on “Carbon based nano-material for solar energy based application”. Third session was handled by Dr Kagzi Shakil, Associate Professor, Mechanical Engineering Department, SNPIT and RC, Umrakh by delivering a topic on “Newest Methods for Surface Modification”.

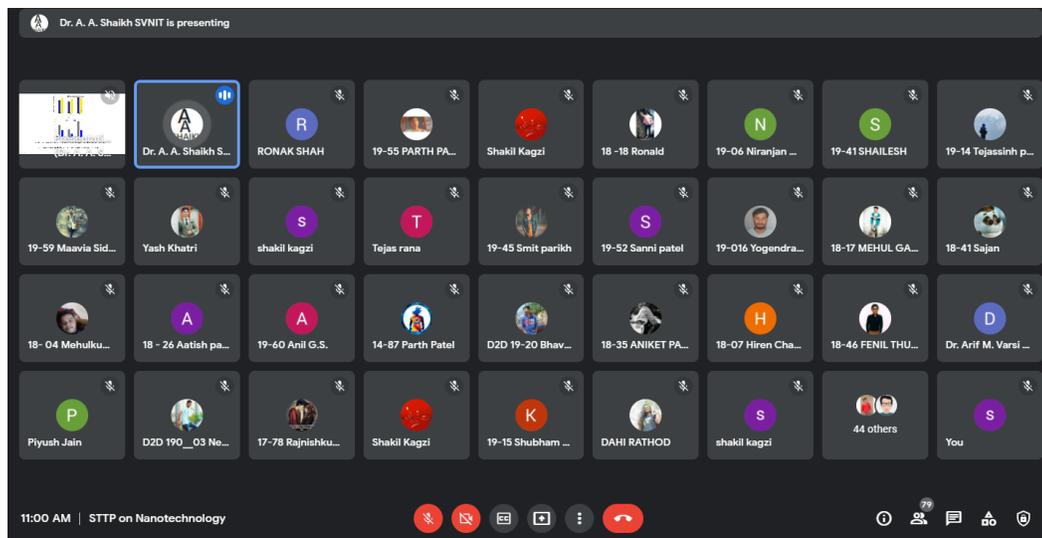
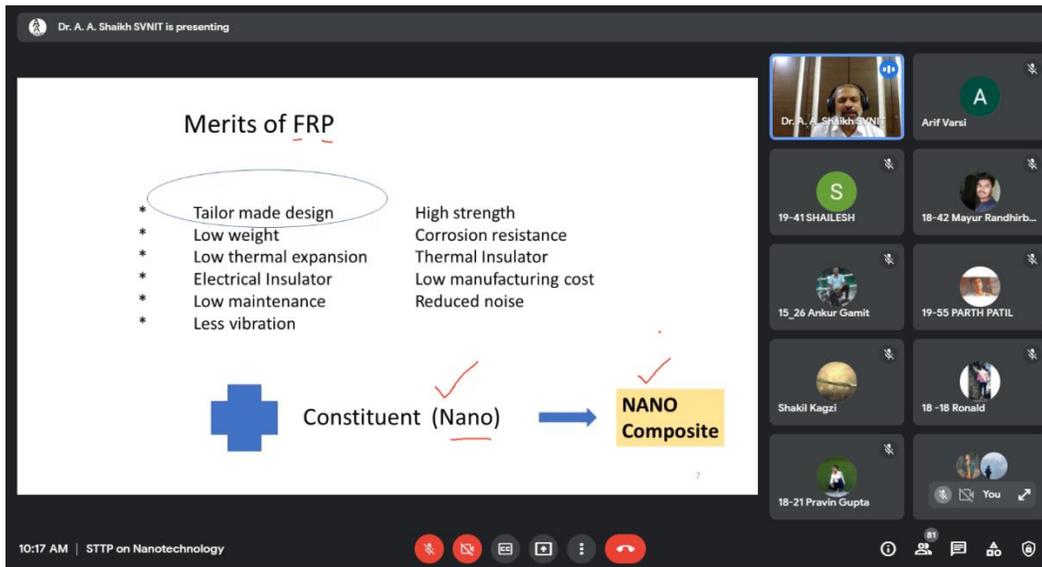


## S N Patel Institute of Technology & Research Centre, Umrah

### ANNEXURE-1

### EVENT PHOTOGRAPHS

**Day 1, Session 1:** Dr A. A. Shaikh, Professor Mechanical Engineering Department from S. V. National Institute of Technology, Surat, had delivered a topic on “Synthesis and Characterisation of Nano-Composites”.





## S N Patel Institute of Technology & Research Centre, Umrah

Dr. A. A. Shaikh SVNIT is presenting

### A case study of Metal based nano composite

Magnesium (Mg) nanocomposites are made by embedding nano-sized particles into a magnesium (or magnesium alloy) matrix. Mg nanocomposites, dubbed "future high-strength energy-saving materials," are **new materials that have a great combination of strength and flexibility**, as well as a superior basic strength property (strength-to-weight ratio). Mg nanocomposites are a good substitute for other structural alloys (such as aluminum and titanium) in applications where low density and high strength are needed, such as transportation, aerospace, and defense

11:06 AM | STTP on Nanotechnology

**Day 1, Session 2:** Dr Jignasa Gohel, Professor, Chemical Engineering Department, S. V. National Institute of Technology, Surat, had delivered a topic on “Nano-science and Nanotechnology for Sustainable Development”.

Jignasa V. Gohel is presenting

12:01 PM | STTP on Nanotechnology

The screenshot shows a grid of 48 participants in a Zoom meeting. The participants are arranged in a 5x10 grid. The first row includes Jignasa V. Gohel (presenting), 14-87 Parth Patel, 19-57 PARTH RA..., 19-33 Swetang..., 19-41 SHAILESH, 15-73 Nirmal Patel, 18-18 Ronald, and 19-51 ROHAN PA... The second row includes 19-24 Martin B..., Yash Khatri, D2D 02 Imran, 19-55 PARTH PA..., 18-04 Mehuku..., 19-22 Vasava Sn..., 19-30 RAHUL CH..., 16-28 Sagar Kele, and 19-56 Amit Rai. The third row includes 18-17 MEHUL GA..., 19-46 Dharmaraj, 19-14 Tejassinh p..., 19-10 Punit Naik, 19-62 Pradip, 19-25 DHAVAL C..., 17-03 Ashish, 18-19 Swapnil Ga..., and 18-46 FENIL THU... The fourth row includes 19-31 RONAK C..., 17-33 Darshan..., RONAK SHAH, nishith patel, D2D 190\_03 No..., D2D 18-17 Nikhil..., D2D 58 Sabir, D2D 19-20 Bhav..., and DAHI RATHOD. The fifth row includes 16-59 Samuel Jo..., 19-09 Neel, 19-15 Shubham..., 18-14 Alka Gamit, 18-26 Aatish pa..., 19-26 JIGNESH..., 19-60 Anil G.S., 4 others, and You.



## S N Patel Institute of Technology & Research Centre, Umrah

Jignasa V. Gohel is presenting

### What is nanotechnology?

While many definitions for nanotechnology exist, the NNI\* calls it "nanotechnology" only if it involves **all** of the following:

1. Research and technology development at the atomic, molecular or macromolecular levels, in the **length scale** of approximately 1 - 100 nanometer range.
2. Creating and using structures, devices and systems that have **novel properties and functions** because of their small and/or intermediate **size**.
3. Ability to **control or manipulate** on the **atomic scale**.

\*National Nanotechnology Initiative

Dr. Jignasa Gohel, NIT, Surat

12:04 PM | STTP on Nanotechnology

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Jignasa V. Gohel is presenting

### Thank You

**Dr. Jignasa V. Gohel**

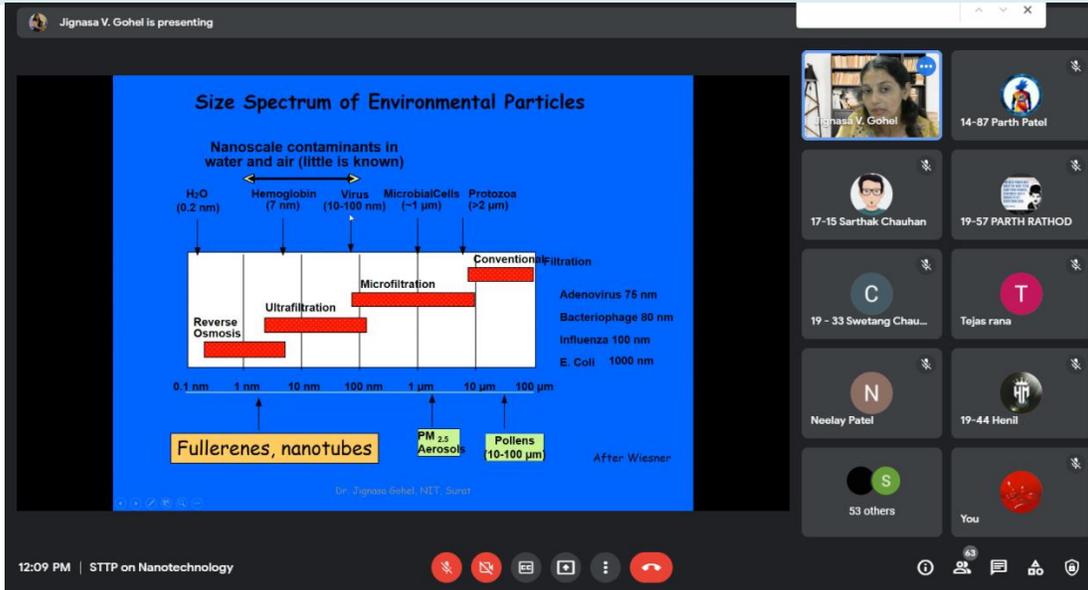
Associate Professor – Chemical Engineering  
 S.V. National Institute of Technology  
 (NIT Surat)  
 Surat-India  
 Email: sjn@ched.svnit.ac.in

Dr. Jignasa Gohel, NIT, Surat

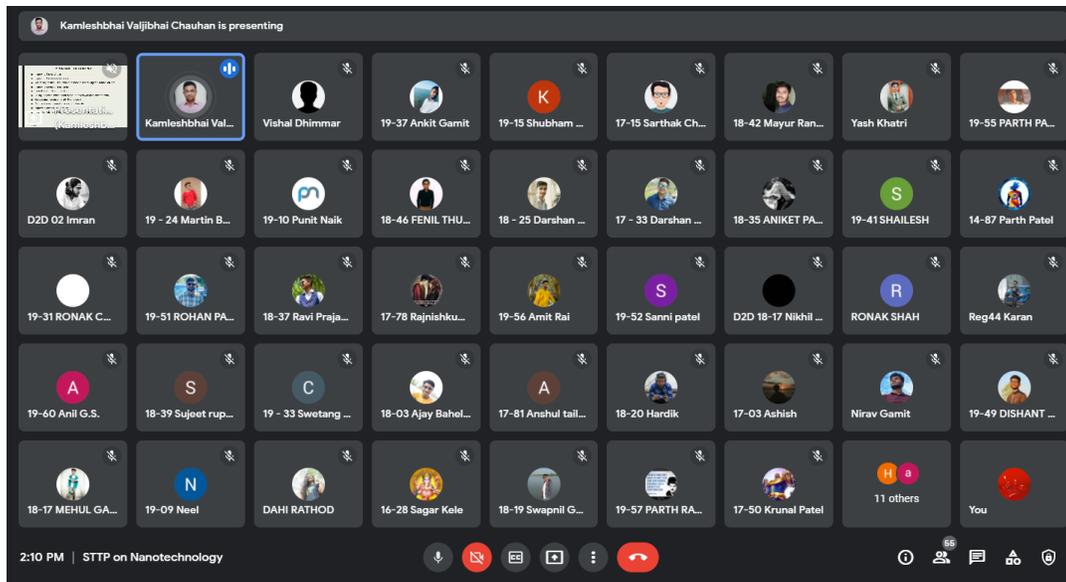
1:00 PM | STTP on Nanotechnology



**S N Patel Institute of Technology & Research Centre, Umrah**



**Day 1, Session 3:** Dr Kamlesh V. Chauhan, Professor, Mechanical Engineering Department, Chandubhai S. Patel Institute of Technology, CHARUSAT-Anand, had delivered a topic on “Nano-Coatings and its Applications”.





## S N Patel Institute of Technology & Research Centre, Umrah

Kamleshbhai Valjibhai Chauhan is presenting

### INTRODUCTION

- A coating is a covering that is applied to the surface of an object, usually referred to as the substrate. Coating play a very important role in the appearance, function and life of the product. Broadly, these are processes that affect either a thin layer on the surface of the part itself, or add a thin layer on top of the surface of the part. The classification of various coating methods as mentioned in Table.

Classification of Various Coating Methods		
Gaseous State	Solution State	Molten or semi-molten State
<ul style="list-style-type: none"><li>PVD</li><li>CVD</li></ul>	<ul style="list-style-type: none"><li>Chemical solution deposition</li><li>Electro chemical deposition</li><li>Solgel</li></ul>	<ul style="list-style-type: none"><li>Laser</li><li>Thermal spraying</li></ul>

06-09-2021 4

2:11 PM | STTP on Nanotechnology

Participants: Kamleshbhai Valjibhai..., Vishal Dhimmur, 19-37 Ankit Gamit, 19-15 Shubham Kumar..., 17-15 Sarthak Chauhan, 18-42 Mayur Randhirb..., Yash Khatri, 19-55 PARTH PATIL, 46 others, You.

Kamleshbhai Valjibhai Chauhan is presenting

- Components details of experiments set up
- Gas Cylinder:-

06-09-2021 10

2:20 PM | STTP on Nanotechnology

Participants: Kamleshbhai Valjibhai..., Yash Khatri, 19-37 Ankit Gamit, 19-15 Shubham Kumar..., 17-15 Sarthak Chauhan, 18-42 Mayur Randhirb..., 19-59 Maavla Siddiqile, 19-016 Yogendra Shukla, 48 others, You.



## S N Patel Institute of Technology & Research Centre, Umrah

**Day 2. Session 1:** Dr Jignasa Gohel, Professor, Chemical Engineering Department, S. V. National Institute of Technology, Surat, had delivered a topic on “Novel Novel Materials Characterisation and uses for Energy Sector”.

The image shows two screenshots from a Zoom meeting. The top screenshot displays a grid of 40 participants, with Dr. Jignasa V. Gohel presenting. The bottom screenshot shows a presentation slide titled "Why Petroleum?" with the following content:

### Why Petroleum?

- Oil delivers more than 15 times the energy of an equal mass of dynamite, 700 times that of a bullet, and 100 times energy of laptop batteries
- One gallon of oil does as much work as 20 workers work 10 hours a day for an entire year
- It is the main ingredient for a variety of consumer products, including pharmaceutical, cosmetics, clothing, pesticides, lubricant, solvents, and ....
- It is CHEAP!!!!

Dr. Jignasa Gohel, NIT, Surat



## S N Patel Institute of Technology & Research Centre, Umrah

REC Jignasa V. Gohel is presenting

### Sources

- Nonrenewable
  - Fossil Fuel (Coal, Oil, Gas)
  - Nuclear (Fission, Fusion)
  - Geothermal
- Renewable
  - Solar (Thermal, Photovoltaic)
  - Wind
  - Waves, Tides, Hydroelectric
  - Biomass

Dr. Jignasa Gohel, NIT, Surat 15

10:26 AM | STTP on Nano-Technology

REC Jignasa V. Gohel is presenting

### Solar spectrum

energy [W/(m<sup>2</sup>.nm)]

wavelength [nm]

www.vicphysics.org

Dr. Jignasa Gohel, NIT, Surat 31

10:45 AM | STTP on Nano-Technology



**S N Patel Institute of Technology & Research Centre, Umrah**

**Day 2 Session 2:** Dr Rishi Kant, Project Scientist, IIT Kanpur, had delivered a topic on “Graphene based nano-materials for waste water treatment”.



## S N Patel Institute of Technology & Research Centre, Umrah

The screenshot shows a Zoom meeting interface. The main window displays a presentation slide titled "Facile synthesis of ZnO/GO nanoflowers over Si substrate for improved photocatalytic decolorization of MB dye and industrial wastewater under solar irradiation". The slide contains two sets of FESEM images: Fig. 2 (a-f) showing ZnO nanoflowers at different magnifications and a SAED pattern, and Fig. 3 (a-d) showing the growth of ZnO nanoflowers over time (6 and 12 hours). The Zoom control bar at the bottom shows the time as 12:30 PM and the meeting name as "STTP on Nano-Technology". The participant list on the right includes Rishi Kant, chotan patel, 18-46 FENIL THUMMAR, 19-44 Honil, Nirav Gamit, 19-14 Tojassinh parmar, and 48 others.

**Day 2, Session 3:** Dr Chandra Bhushan Pal, Assistant Professor, Chemical Engineering Department, SNPIT and RC, Umrah had delivered a topic on “Characterisation of Nano-Material”.

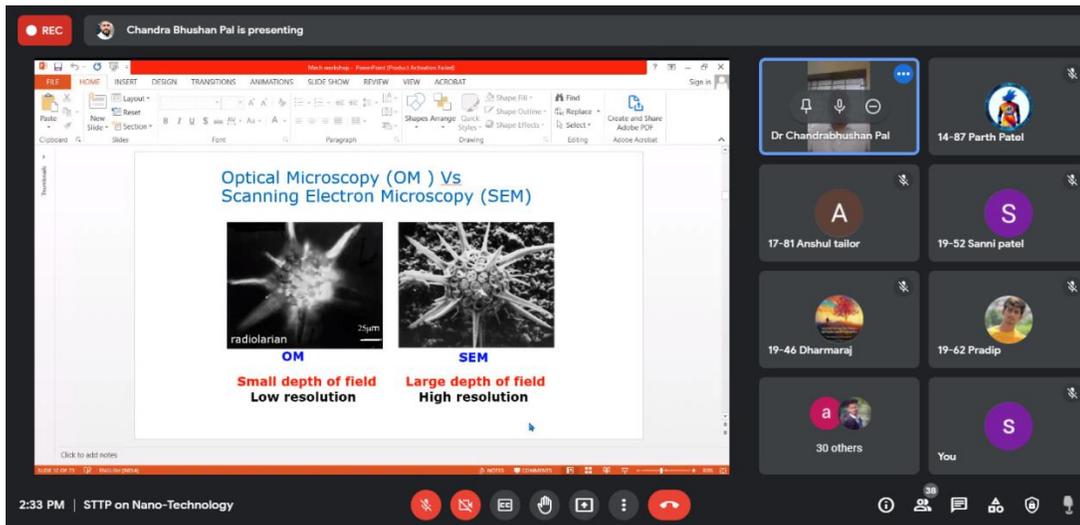
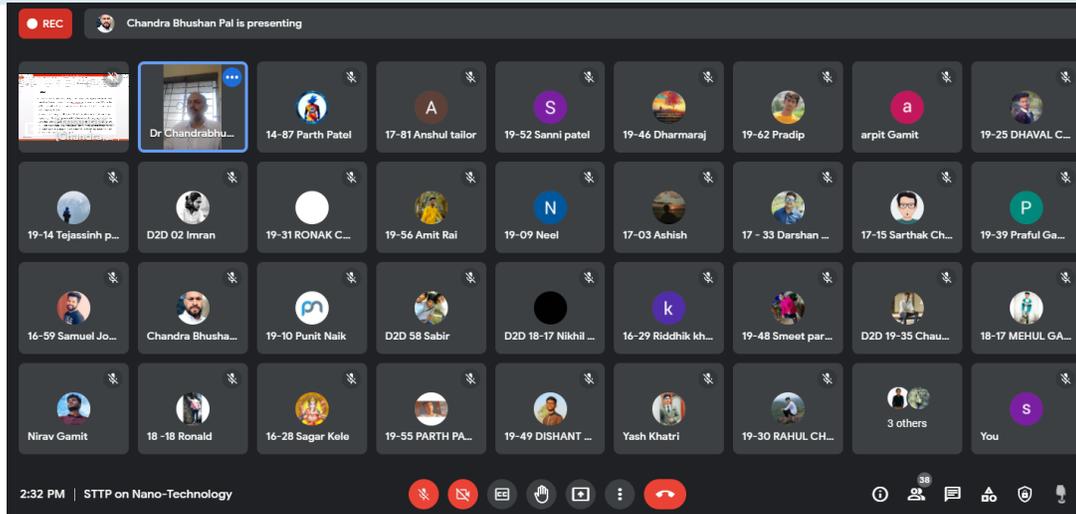
The screenshot shows a Zoom meeting interface. The main window displays a presentation slide titled "Continue..." with the following text:

- As an example, macromolecules and particles made of a limited number of molecules, in the size range of one to fifty nanometers possess distinct chemical (i.e., reactivity, catalytic potential, etc.), physical (i.e., magnetic, optical, etc.).
- Some of such properties are, somehow, intermediate between those of the smallest elements (atoms and molecules) from which they can be composed of and those of the macroscopic materials.
- Compared to bulk materials, it is demonstrated that nanoparticles possess enhanced performance properties when they are used in similar applications.
- An important application of nanoparticles is recognized to be the production of a new class of catalysts known as nanocatalysts.

The Zoom control bar at the bottom shows the time as 2:30 PM and the meeting name as "STTP on Nano-Technology". The participant list on the right includes Dr Chandrabhushan Pal, 14-87 Parth Patel, 17-81 Anshul tailor, 19-46 Dharmaraj, 19-62 Pradip, 19-52 Sanni patel, and 29 others.



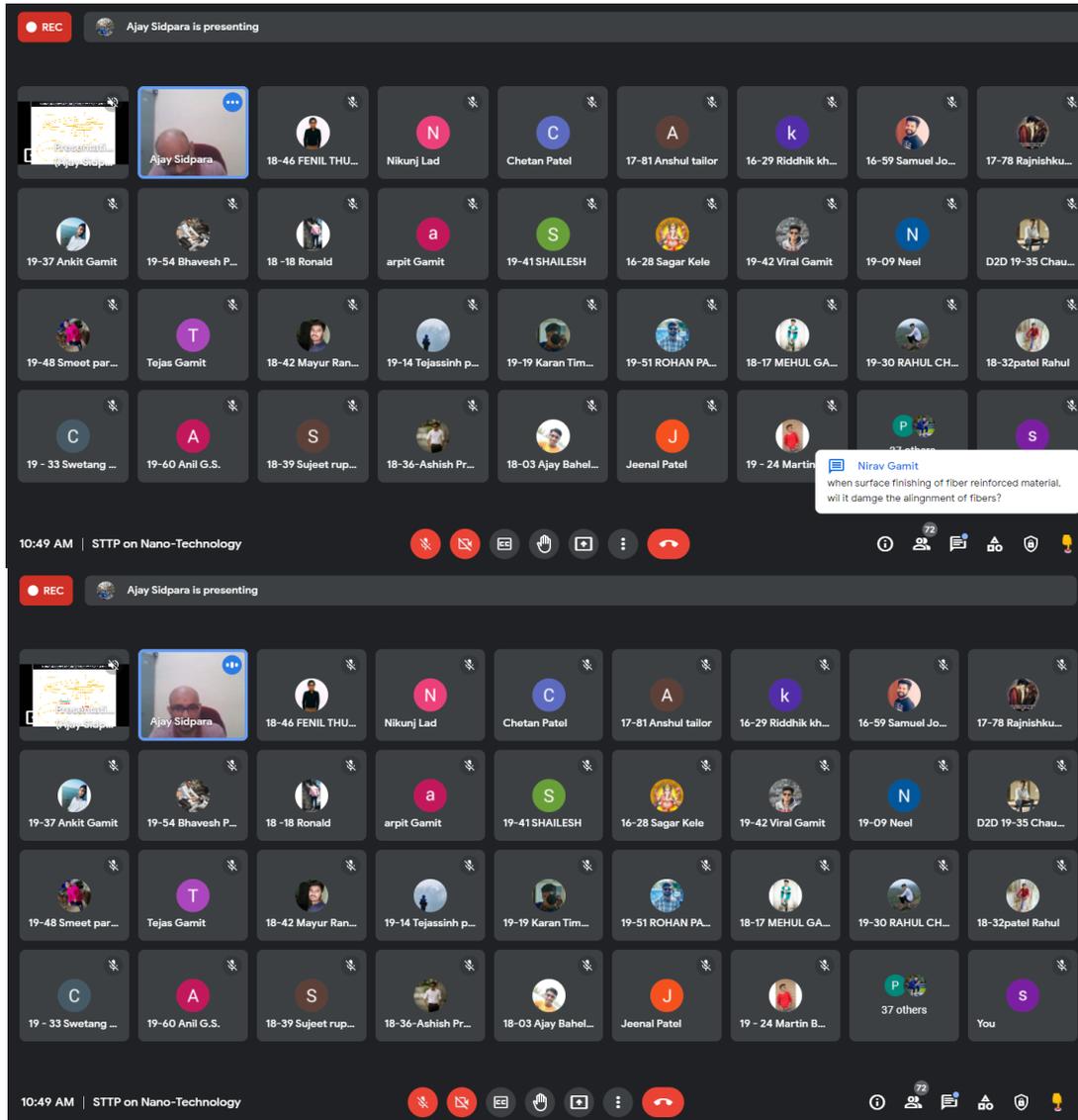
## S N Patel Institute of Technology & Research Centre, Umrah





## S N Patel Institute of Technology & Research Centre, Umrah

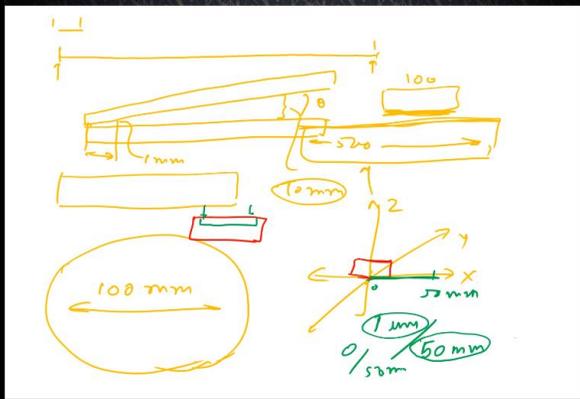
**Day 3, Session 1:**Dr Ajay Sidpara, Associate Professor, Mechanical Engineering Department, IIT Kharagpur, had delivered a session on “Nanofinishing”.



## S N Patel Institute of Technology & Research Centre, Umrah

REC Ajay Sidpara is presenting

**Contact area between finishing tool and workpiece surface**



10:50 AM | STTP on Nano-Technology

Participants: Ajay Sidpara, 18-46 FENIL THUMMAR, Nikunj Lad, Chetan Patel, 17-81 Anshul tailor, 16-29 Riddhik khalasi, 64 others, You.

REC Ajay Sidpara is presenting

**Advanced finishing processes**

- Magnetorheological fluid based finishing (MRFF)
- Abrasive flow machining / finishing (AFM/F)
- Chemical mechanical polishing (CMP)
- Magnetic abrasive finishing (MAF)
- Elastic emission machining (EEM)
- Magnetic float polishing (MAF)
- Diamond turning (ultra precision machining)



11:02 AM | STTP on Nano-Technology

Participants: Ajay Sidpara, 18-46 FENIL THUMMAR, Nikunj Lad, Chetan Patel, 16-29 Riddhik khalasi, 17-81 Anshul tailor, 62 others, You.

REC Ajay Sidpara is presenting

**Magnetorheological finishing (MRF)**

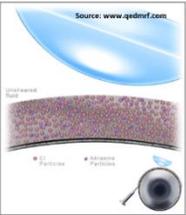
- Magnetorheological (MR) fluid is extruded onto a rotating wheel in a thin ribbon that will contact the workpiece surface.
- Electromagnet below the polishing wheel exert a strong local Magnetic field gradient which stiffens MR fluid.
- Precisely controlled zone of magnetized fluid becomes the polishing tool
- Selection of carrier liquid and abrasive particles significantly affect the process performance.

**MR fluid**

Magnetic particles	Abrasive particles	Carrier liquid	Surfactant / additives
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Source: www.qdinf.com



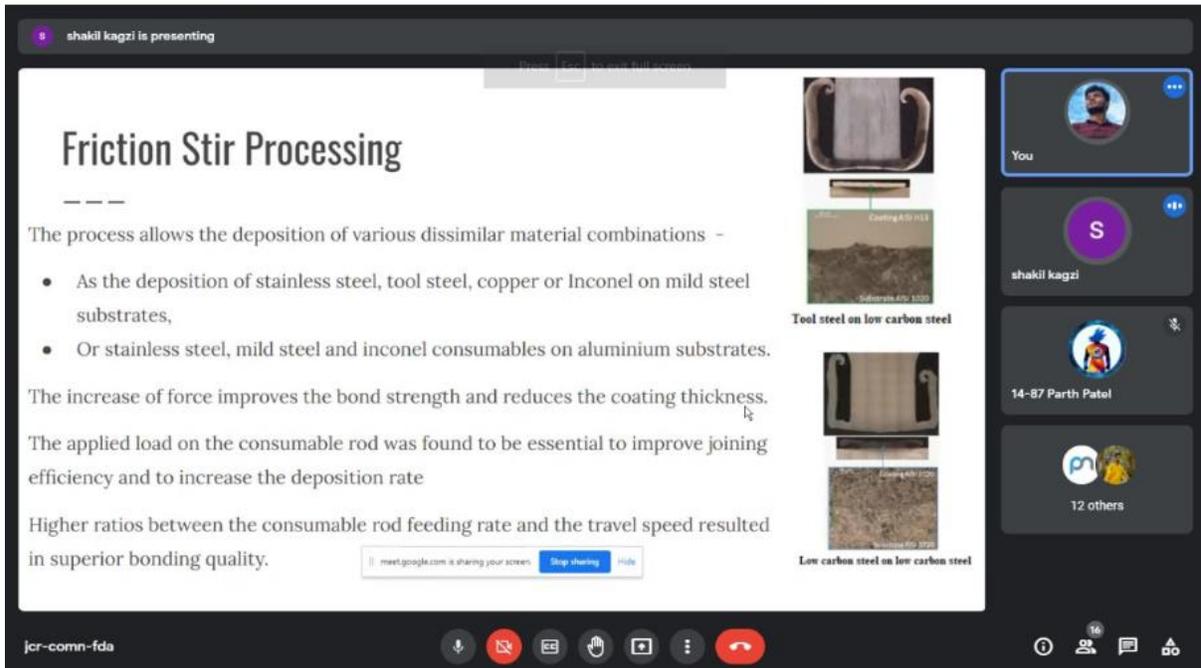
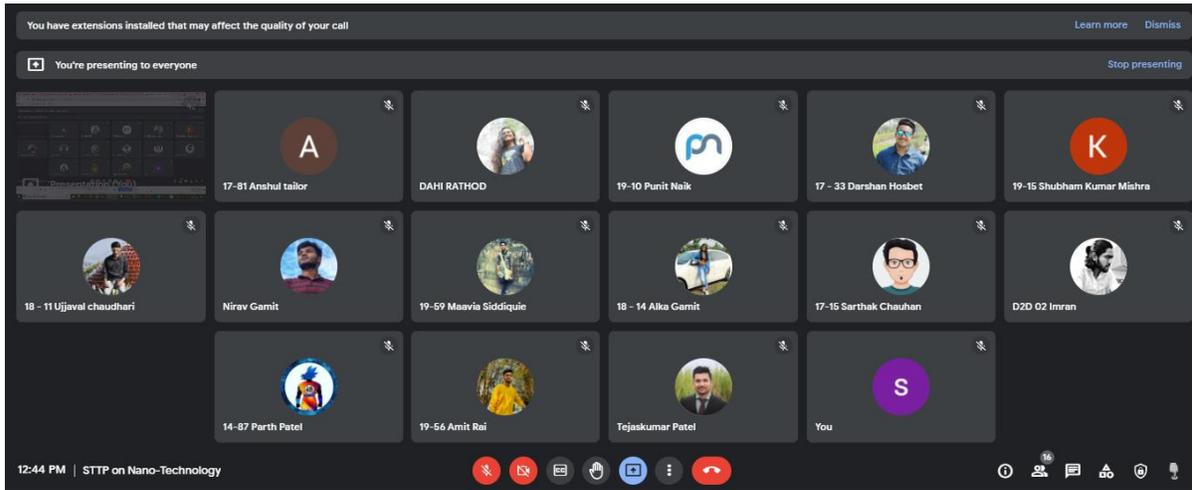
11:09 AM | STTP on Nano-Technology

Participants: Ajay Sidpara, 18-46 FENIL THUMMAR, Nikunj Lad, Chetan Patel, 17-81 Anshul tailor, 16-29 Riddhik khalasi, 63 others, You.



**S N Patel Institute of Technology & Research Centre, Umrah**

**Day 3, Session 2:** Dr Kagzi Shakil A., Associate Professor, S N Patel Institute of Technology and Research Center, Umrah had taken session on the “Newest Method of the Surface Modification.”





## S N Patel Institute of Technology & Research Centre, Umrah

**Day 4, Session 1:** The first session was taken by Dr. D. M. Patel, Associate Professor, Graduate school of pharmacy, on "Nanotechnology in Pharmaceutical Drug Delivery System", Which is an application of nanotechnology beyond engineering.

**Slide 1: Nanotechnology in Pharmaceutical Drug Delivery System**

Delivered at:  
GUJCOST & DST sponsored Five days Online STTP  
on  
*Nanotechnology: Materials, Characterization,  
Synthesis and Applications*  
Organized by:  
Mechanical Engg. Department  
S. N. Patel Institute of Technology & Research Centre,  
Umrah-Bardoli, Surat

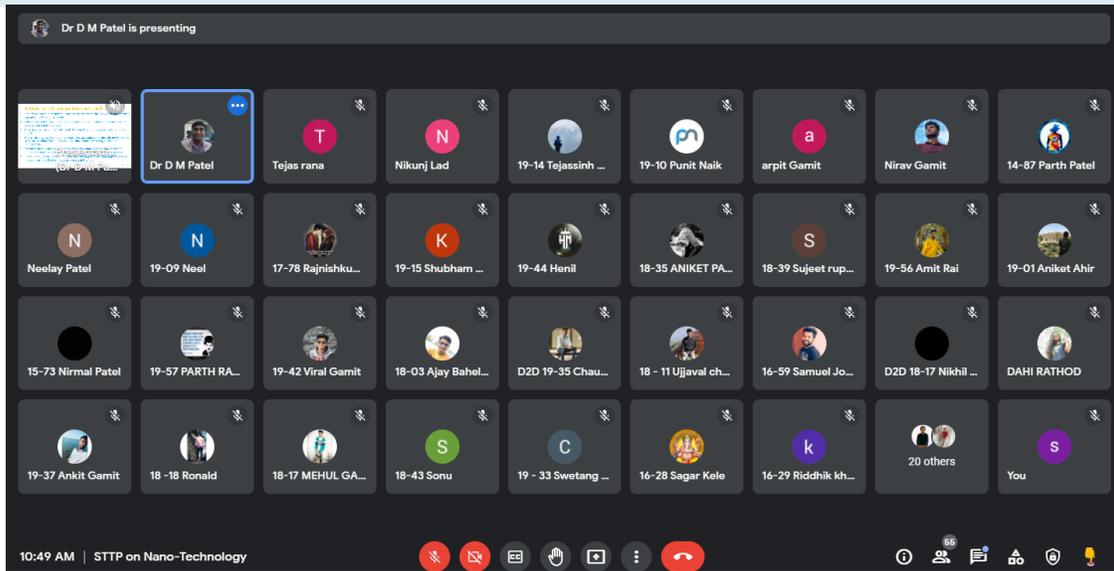
**Dr. D. M. Patel**  
Associate Professor  
Graduate School of Pharmacy  
Gujarat Technological University

**Slide 2: Interaction of nanoparticles with cells**

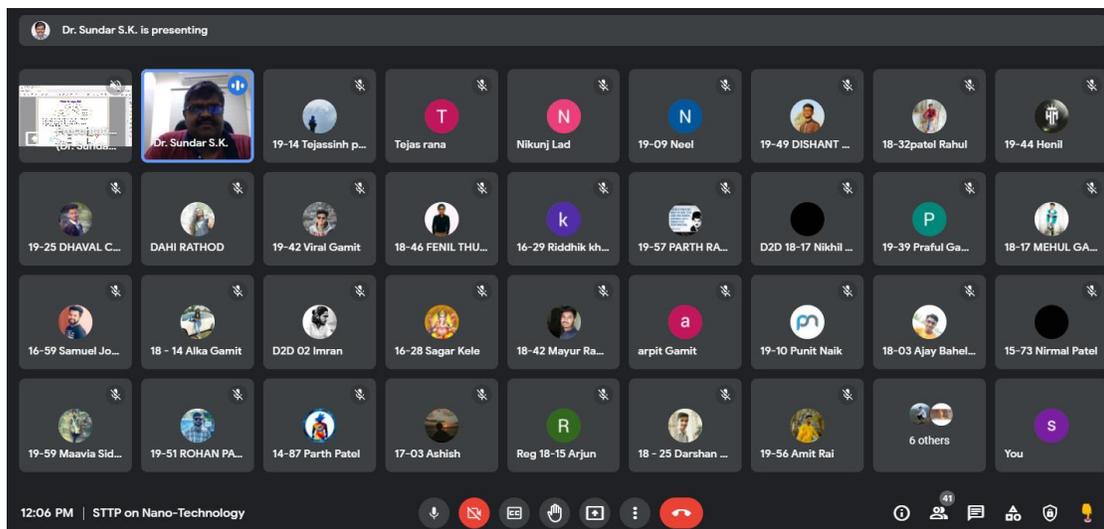
- Inhalation, ingestion or dermal invasions are the route through which nanoparticles can enter into the human body
- After entering into the living body it interacts with a number of biomolecules such as sugars, proteins and lipids
- They are dissolved in the body fluids like interstitial fluid between cells, lymph or blood
- There is immediate coating of nanoparticles takes place and thus the newly formed structure is called "protein corona" that determines the biological fate of nanoparticles
- Its composition is dynamic and depends on the relative concentrations of the individual components and on their affinities toward the nanoparticle surface
- In fact, nanoparticles have to be viewed as evolving systems that adapt to varying concentrations of the biomolecules present in the fluid



## S N Patel Institute of Technology & Research Centre, Umrah



**Day 4, Session 2:** Dr S. K. Sundar., Assistant Professor, S. V. National Institute of Technology, Surat, had taken session on the “Nanoencapsulation of Bioactive Compounds: Methods, Challenges and Future Perspective.”





**S N Patel Institute of Technology & Research Centre, Umrah**

Dr. Sundar S.K. is presenting

**Nanoencapsulation**

Coacervation

- Simple
- Complex

- Oil phase – polymer/ Aqueous phase – Bioactive compound
- Ionic forces and hydrophobic interactions
- Separates into polymer rich and polymer deficient phase.
- Centrifuged → washed → dried.

Simple (Add electrolyte) → Centrifuge

Complex (Adjust pH) → Centrifuge

12:06 PM | STTP on Nano-Technology

REC Dr. Sundar S.K. is presenting

**Nanoencapsulation**  
 (lamulsification - Top down approach)

1. High pressure homogenization
2. Microfluidization
3. Ultrasonication

Feed

valve

Feed

- High pressure – 300 kPa.
- Cavitation, turbulence.
- Disruption by turbulent eddies.
- $P_1 = 2 \cdot R$

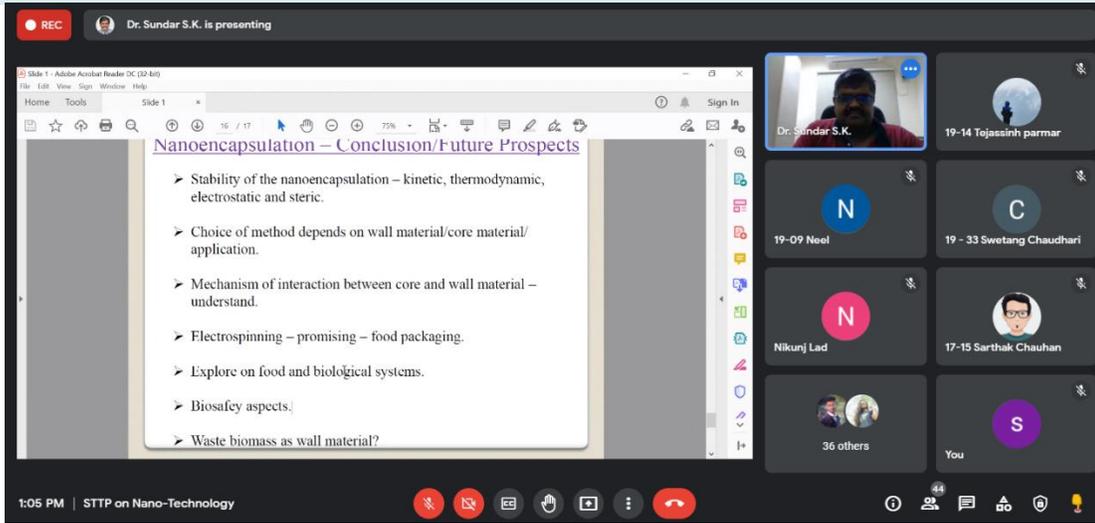
- Microchannels.
- High pressure – 300 kPa.
- Cavitation, high shear and impulse force.

- Sound waves > 20 kHz.
- Cavitation, high shear and disruptive force.

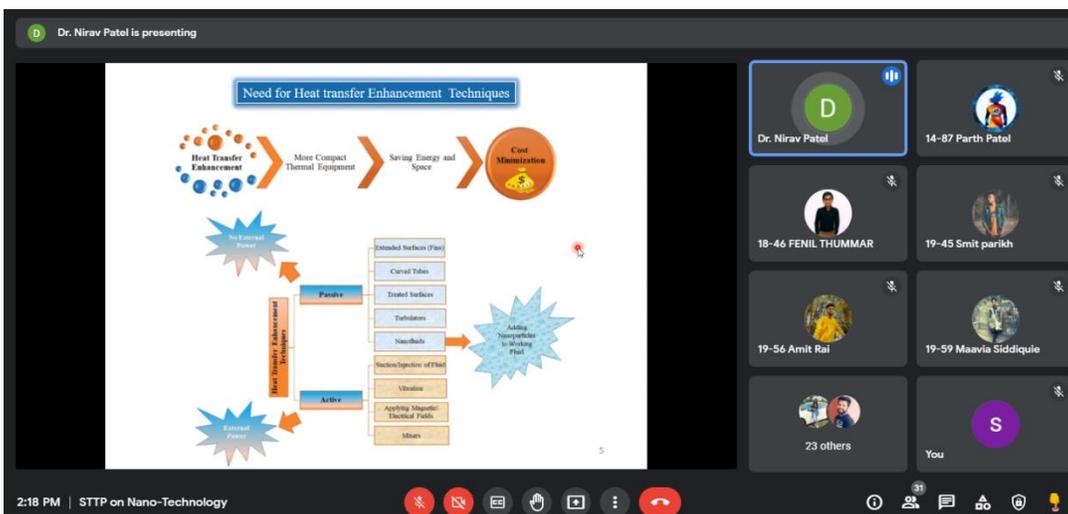
12:15 PM | STTP on Nano-Technology



**S N Patel Institute of Technology & Research Centre, Umrah**



**Day 4, Session 3:** Dr Nirav Patel, Assistant Professor, Mechanical Engineering Department, SNPIT and RC, Umrah had delivered a topic on “Nanofluids”.





## S N Patel Institute of Technology & Research Centre, Umrah

REC Dr. Nirav Patel is presenting

Dr. Nirav Patel 14-87 Parth Patel 18-46 FENIL THUM... 19-56 Amit Rai 19-59 Maavia Siddi... 18-14 Alka Gamit 16-59 Samuel Josh...

D2D 02 Imran 19-10 Punit Naik 17-33 Darshan Hos... D2D 18-17 Nikhil Ga... 17-81 Anshul tailor D2D 19-20 Bhavesh... 16-28 Sagar Kete 19-55 PARTH PATIL

Nirav Gamit 19-09 Neel 18-25 Darshan Par... DAHI RATHOD 19-30 RAHUL CHAU... 18-03 Ajay Baheliya 18-18 Ronald 19-016 Yogendra Sh...

18-39 Sujest rupap... 19-52 Sanni patel 19-06 Niranjan Gamit rahul solanki 19-40 Pratik Gamit 19-62 Pradip 19-45 Smit parikh You

2:20 PM | STTP on Nano-Technology

REC Dr. Nirav Patel is presenting

### Solar Collectors

**Absorption coefficient** and **extinction coefficient** increases with the increase of volume fraction and particle size, whereas the **transmittance** of nanofluids generally decreases with increase in nanoparticle concentrations. Carbon nanotubes (CNTs) and graphene that exhibit **high thermal conductivity, unique optical properties**, good mechanical strength, and the **large surface area** is reported to have a potential in the area of DASCs and volumetric solar collectors, Flat plate, evacuated and PV/T collectors.

Renewable and Sustainable Energy Reviews 74 (2017) 633-670.  
Renewable and Sustainable Energy Reviews 94 (2018) 302-316.

Dr. Nirav Patel 14-87 Parth Patel

18-46 FENIL THUMMAR 19-56 Amit Rai

19-59 Maavia Siddique 18-14 Alka Gamit

25 others You

2:21 PM | STTP on Nano-Technology



**S N Patel Institute of Technology & Research Centre, Umrah**

**Day 5, Session 1:** The first session was taken by Dr. S. V. Shrivastava, Assistant Professor, Government Engineering College, Valsad, on "Nanotechnology in Catalysis".

The screenshot shows a Zoom meeting interface with a presentation slide titled "INTRINSIC PROPERTIES OF NANO-MATERIALS AS A CATALYST". The slide contains a flowchart with three main categories: Mechanical Properties (Bandgap, Band Structure, Magnetic Properties), Lattice Parameters (Atomic density, Binding Energy), and Activation Energy (Phase Transitions). These categories are linked to three effects: Composition and Oxidation State effect, Shape, Size and Interparticle distance effect, and Support and Confinement effect.

Below the main image, there are three smaller screenshots of the Zoom meeting at different times: 10:28 AM, 10:31 AM, and 10:32 AM. The 10:31 AM and 10:32 AM screenshots show a presentation slide titled "NANO MATERIALS IN CATALYSIS". This slide is divided into "Characteristics" and "Types".

**Characteristics:**

- High Surface area
- High catalytic activity
- Highly adsorbent
- Prone to agglomeration
- Range of possible chemistry
- Natural & Synthetic
- Wide range of applications

**Types:**

Carbon	Metal and Oxide	Others
Carbon, Carbon black, CNT, Graphene, Inorganic Nanotubes such as TiO <sub>2</sub> and SiO <sub>2</sub> silicate	Al, Fe, Ag, Co, TiO <sub>2</sub> , CeO <sub>2</sub> , ZnO, Al <sub>2</sub> O <sub>3</sub> , ZnO	Clay and Quantum dots

The meeting interface also shows a list of participants on the right side, including SANJAYKUMAR, 14-87 Parth Patel, 18-11 Ujjaval chau..., 18-21 Pravin Gupta, and others.



## S N Patel Institute of Technology & Research Centre, Umrah

**CASE STUDY: SYNTHESIS OF Pt-NANO-CATALYST**

The slide illustrates three synthesis routes for Pt-Nano-Catalyst:

- Biological Synthesis:** Involves microorganisms (bacteria, fungi, plants) and enzymes to synthesize Pt-Nano-Catalyst from PtCl<sub>6</sub><sup>2-</sup> and NaOH.
- Chemical Synthesis:** Involves reduction of PtCl<sub>6</sub><sup>2-</sup> using reducing agents like NaBH<sub>4</sub>, NaHSO<sub>3</sub>, and NaOH.
- Physical Synthesis:** Involves laser ablation of Pt target in a liquid medium.

The process includes steps like 'Separation of Pt Nano-Catalyst', 'Washing', and 'Drying' to yield 'Pt-NANO-CATALYST'.

**SYNTHESIS OF NANOCATALYSTS**

The slide details the following synthesis methods:

- Top-Down Approach:** Chemical Etching, Laser Ablation, Milling Process, Spinning, Thermal Decomposition, Lithography.
- Bottom-Up Approach:** Chemical Vapor Deposition, Sol-Gel, Laser Pyrolysis, Spray Method, Molecular Condensation, Aerosol Process.
- Chemical Synthesis:** Coating Process, Synthesis.
- Physical Method:** Laser Ablation, Molecular-Substrate.
- Biological Synthesis:** Biological Substance, Metal Ions, Biological Substances.

The slide also shows 'Different Shapes of the Nanoparticles'.

**Day 5, Session 2: Dr Rishi Kant, Project Scientist, IIT Kanpur, had delivered a topic on “Carbon based nano-material for solar energy based application”.**

**Carbon based nanomaterials for solar energy applications**

A presentation as a part of  
 "Five days Online STTP on Nanotechnology: Materials, Characterization, Synthesis and Applications"

Presented by:  
**Dr. Rishi Kant**  
 Project Scientist  
 Department of Mechanical Engineering,  
 Indian Institute of Technology Kanpur, Uttar Pradesh, India



## S N Patel Institute of Technology & Research Centre, Umrah

This screenshot shows a Zoom meeting grid with 26 participants. The participants are arranged in a 5x5 grid, with the last row containing only 6 participants. The participants are:

- Row 1: Presentation (Rishi Kant), Rishi Kant, 19-10 Punit Naik, 17-15 Sarthak Chauhan, 16-29 Riddhik khalasi, 14-87 Parth Patel, 19-57 PARTH RATHOD
- Row 2: Reg 18-15 Arjun, D2D 19-35 Chaudhary Ma..., 17-33 Darshan Hosbet, 19-56 Amit Rai, 19-59 Maavia Siddique, D2D 02 Imran, 19-31 RONAK CHAUDHARI
- Row 3: 16-59 Samuel Joshua Seji, 19-30 RAHUL CHAUDHARI, 17-81 Anshul tailor, 19-39 Praful Gamit, 17-78 Rajnishkumar Singh, 19-49 DISHANT PATEL, 19-33 Swetang Chaudhari
- Row 4: Nirav Gamit, 19-52 Sanni patel, 19-62 Pradip, DAHI RATHOD, 18-46 FENIL THUMMAR, 18-14 Alike Gamit, You

The meeting title is "STTP on Nano-Technology" and the time is 2:53 PM. A notification at the top says "You have extensions installed that may affect the quality of your call".

This screenshot shows a Zoom meeting with a presentation slide titled "Introduction" displayed. The slide content is as follows:

**Introduction**

Compared to other types of renewable energy sources, solar energy is much more environment friendly and sustainable. Due to availability of sunlight at nearly whole earth's surface. The assessment of renewable power generation using different technologies such as biomass, wind energy, solar PV, hydropower etc. in the Sustainable Development Scenario (SDS) 2000-2050.

The slide also features a bar chart showing "TWh (Terawatt-hour)" on the y-axis (ranging from 0 to 17,000) and "Year" on the x-axis (ranging from 2000 to 2050). The chart shows a significant increase in renewable power generation over time, with a sharp rise starting around 2020.

The meeting title is "STTP on Nano-Technology" and the time is 3:04 PM. A notification at the top says "You have extensions installed that may affect the quality of your call".

This screenshot shows a Zoom meeting with a presentation slide titled "Carbon based nanomaterials for solar energy applications" displayed. The slide content is as follows:

**Carbon based nanomaterials for solar energy applications**

**Best Research-Cell Efficiencies**

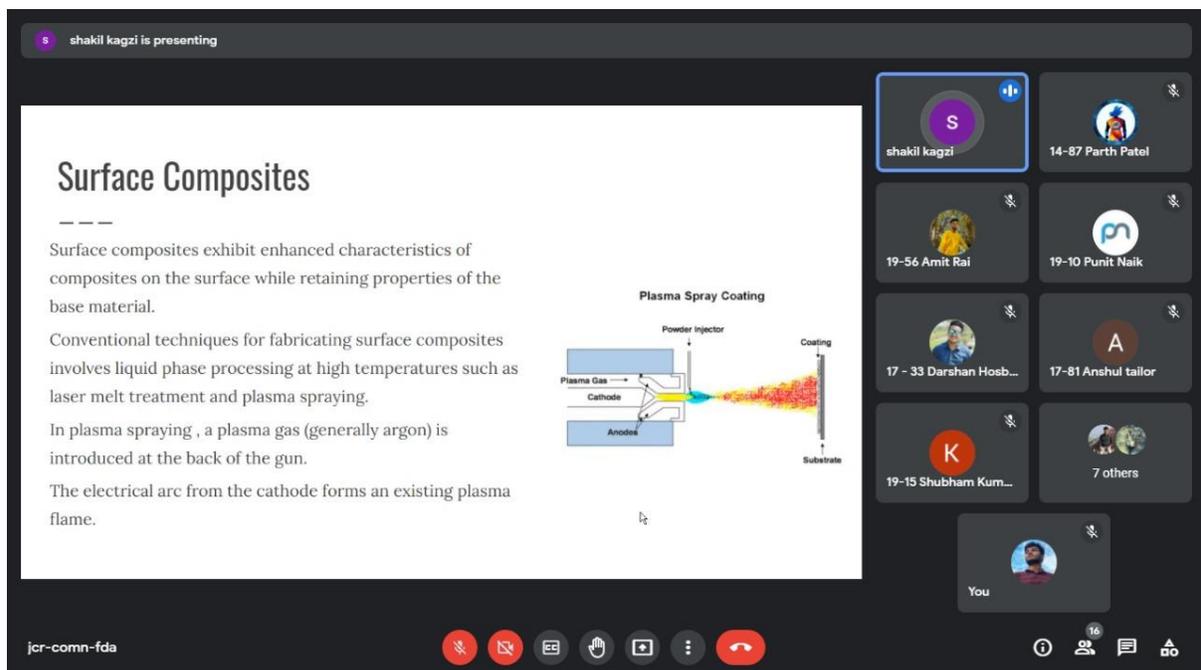
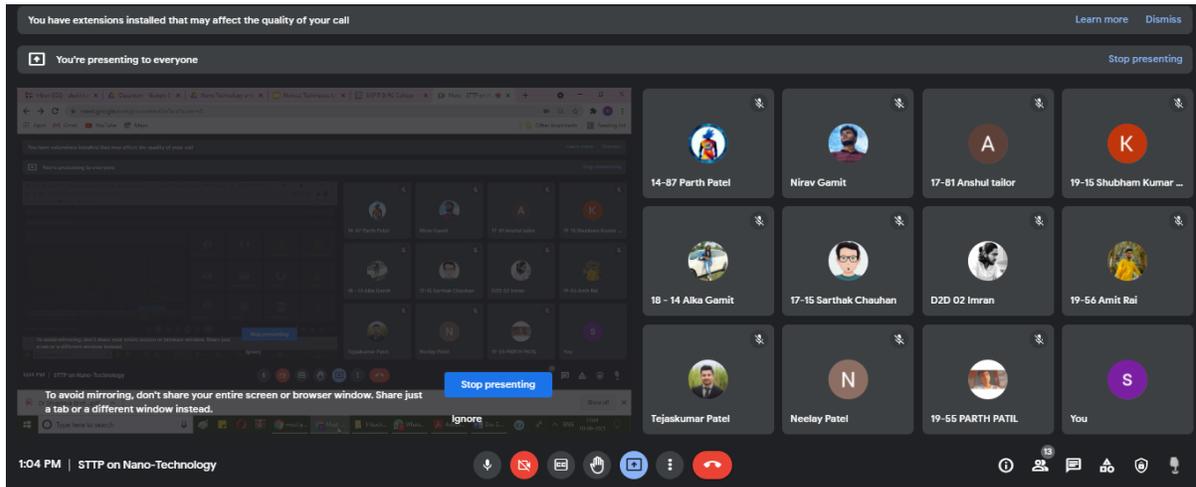
The slide features a complex line graph showing "Cell Efficiency (%)" on the y-axis (ranging from 0 to 50) and "Year" on the x-axis (ranging from 1970 to 2020). The graph tracks the efficiency of various solar cell technologies over time, including Silicon, Polysilicon, Monocrystalline Silicon, Polycrystalline Silicon, Thin-Film, and Heterojunction. A red circle highlights a specific data point on the graph, likely representing a recent breakthrough in carbon-based nanomaterials.

The meeting title is "STTP on Nano-Technology" and the time is 3:06 PM. A notification at the top says "You have extensions installed that may affect the quality of your call".



## S N Patel Institute of Technology & Research Centre, Umrah

**Day 5, Session 3:** Dr Kagzi Shakil A, Associate Professor, Mechanical Engineering Department, SNPIT and RC, Umrah had delivered a topic on “Newest Methods for Surface Modification”.





**SITARAMBHAI NARANJI PATEL**  
INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE,UMRAKH  
(Managed by Vidyabharti Trust Institution)

A Vidyabharti Trust Institution  
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227481, 225458  
Email: admin@snpitrc.ac.in, vbtdegree\_umrakh@yahoo.co.in  
Website: www.snpitrc.ac.in

## S N Patel Institute of Technology & Research Centre, Umrah

For the grand success of event Vidyabharti Trust Members, Principal Dr. Piyush Jain, Administrator Dr. Akshay Gupta, all department heads and DST GUJCOST officials congratulated the Institute.

### ANNEXURE-2

#### SAMPLE CERTIFICATE OF PARTICIPANTS

The certificate is a rectangular document with a light beige background and a dark brown border. At the top left is the SNPITRC logo. The main text is centered and reads: 'S. N. Patel Institute of Technology & Research Centre (A Vidyabharti Trust Institution) Certificate of Participation This is to certify that \_\_\_\_\_ has participated in GUJCOST, DST, Government of Gujarat Sponsored Five days Online STTP on Nanotechnology: Materials, Characterization, Synthesis and Applications (6<sup>th</sup> - 10<sup>th</sup> September, 2021) held at S. N. Patel Institute of Technology & Research Centre, Umrah. Dr. Piyush S. Jain Principal SNPIT&RC, UMRAKH'. On the right side, there are two logos: 'Sponsored By Dst Department of Science & Technology Government of Gujarat' and 'Gujarat Council on Science & Technology (GUJCOST)'. A signature of Dr. Piyush S. Jain is visible above the name.

**S. N. Patel Institute of Technology & Research Centre**  
(A Vidyabharti Trust Institution)

**Certificate of Participation**

This is to certify that

\_\_\_\_\_

has participated in  
GUJCOST, DST, Government of Gujarat Sponsored  
Five days Online STTP on  
**Nanotechnology: Materials, Characterization, Synthesis and Applications**  
(6<sup>th</sup> - 10<sup>th</sup> September, 2021)  
held at S. N. Patel Institute of Technology & Research Centre, Umrah.

*Piyush Jain*  
**Dr. Piyush S. Jain**  
Principal  
SNPIT&RC, UMRAKH

Sponsored By  
**Dst**  
Department of Science & Technology  
Government of Gujarat

Gujarat Council on Science & Technology (GUJCOST)



## S N Patel Institute of Technology & Research Centre, Umrakh

### ANNEXURE-3

#### LIST OF PARTICIPANTS

Sr. No.	Name	Name of college/ organisation	Position
1	Bhaveshbhai Jagdishbhai Vasava	SNPIT & RC UMRAXH, BARDOLI	Student
2	Darshan Rameshbhai Parmar	SNPIT & RC UMRAXH, BARDOLI	Student
3	Gamit Alka Alubhai	SNPIT & RC UMRAXH, BARDOLI	Student
4	Chaudhari Rahulbhai Jayantibhai	SNPIT & RC UMRAXH, BARDOLI	Student
5	Kevin Rajaram Patel	SNPIT & RC UMRAXH, BARDOLI	Student
6	Singh Rajnishkumar Harendra	SNPIT & RC UMRAXH, BARDOLI	Student
7	Sajan Kumar	SNPIT & RC UMRAXH, BARDOLI	Student
8	Chaudhari Ronakkumar Rasikbhai	SNPIT & RC UMRAXH, BARDOLI	Student
9	Vasava Snehalbhai Shukkarbhai	SNPIT & RC UMRAXH, BARDOLI	Student
10	Shukla Yogendrakumar Hemantkumar	SNPIT & RC UMRAXH, BARDOLI	Student
11	Mayur Randhirbhai Salve	SNPIT & RC UMRAXH, BARDOLI	Student
12	Patel Sannikumar B.	SNPIT & RC UMRAXH, BARDOLI	Student
13	Aniket Pawar	SNPIT & RC UMRAXH, BARDOLI	Student
14	Krunal Patel	SNPIT & RC UMRAXH, BARDOLI	Student
15	Rajan Kumar	SNPIT & RC UMRAXH, BARDOLI	Student
16	Chaudhari Swetangbhai Ashvinbhai	SNPIT & RC UMRAXH, BARDOLI	Student
17	Thummar Fenil Ishwarbhai	SNPIT & RC UMRAXH, BARDOLI	Student
18	Siddiquie Maavia Moinuddin	SNPIT & RC UMRAXH, BARDOLI	Student
19	Bhoya Mehulkumar Sanjaybhai	SNPIT & RC UMRAXH, BARDOLI	Student
20	Vasava Pradipkumar Ratilal	SNPIT & RC UMRAXH, BARDOLI	Student
21	Gamit Ashishkumar Govindbhai	SNPIT & RC UMRAXH, BARDOLI	Student
22	Rai Amitkumar Santoshkumar	SNPIT & RC UMRAXH, BARDOLI	Student
23	Parmar Smeetkumar Kamleshbhai	SNPIT & RC UMRAXH, BARDOLI	Student
24	Gamit Viralkumar Natubhai	SNPIT & RC UMRAXH, BARDOLI	Student
25	Gamit Ronald Harilal	SNPIT & RC UMRAXH, BARDOLI	Student
26	Mehulbhai Mohanbhai Gamit	SNPIT & RC UMRAXH, BARDOLI	Student
27	Chaudhari Pratikbhai Rajendrabhai	SNPIT & RC UMRAXH, BARDOLI	Student
28	Patil Parth Sunilbhai	SNPIT & RC UMRAXH, BARDOLI	Student
29	Patel Rohan Bipinbhai	SNPIT & RC UMRAXH, BARDOLI	Student
30	Gupta Pravin Surendra	SNPIT & RC UMRAXH, BARDOLI	Student
31	Sujeet Rupapara	SNPIT & RC UMRAXH, BARDOLI	Student
32	Tank Viraj Harsukhbhai	SNPIT & RC UMRAXH, BARDOLI	Student
33	Gamit Prafulkumar Ishwarbhai	SNPIT & RC UMRAXH, BARDOLI	Student
34	Patel Dishant Mukeshbhai	SNPIT & RC UMRAXH, BARDOLI	Student
35	Shingade Anil Gangarambhai	SNPIT & RC UMRAXH, BARDOLI	Student
36	Rathod Parth M	SNPIT & RC UMRAXH, BARDOLI	Student
37	Mistry Henil Arunbhai	SNPIT & RC UMRAXH, BARDOLI	Student
38	Shailesh Gamit	SNPIT & RC UMRAXH, BARDOLI	Student



### S N Patel Institute of Technology & Research Centre, Umrakh

39	Hiren Chaudhari	SNPIT & RC UMRAXH, BARDOLI	Student
40	Patel Rahulbhai Pravinbhai	SNPIT & RC UMRAXH, BARDOLI	Student
41	Sandip Bhoi	SNPIT & RC UMRAXH, BARDOLI	Student
42	Nevil Jayeshkumar Asamaniwala	SNPIT & RC UMRAXH, BARDOLI	Student
43	Ansari Imran	SNPIT & RC UMRAXH, BARDOLI	Student
44	Ajay Radheshyam Baheliya	SNPIT & RC UMRAXH, BARDOLI	Student
45	Patel Parth	SNPIT & RC UMRAXH, BARDOLI	Student
46	Parthkumar Ranjitbhai Patel	SNPIT & RC UMRAXH, BARDOLI	Student
47	Nirmalkumar Harshadbhai Patel	SNPIT & RC UMRAXH, BARDOLI	Student
48	Bhavesh Jayeshbhai Patil	SNPIT & RC UMRAXH, BARDOLI	Student
49	Naik Punit Pradipbhai	SNPIT & RC UMRAXH, BARDOLI	Student
50	Bhimda Martinbhai Jayantibhai	SNPIT & RC UMRAXH, BARDOLI	Student
51	Hardik Kania	SNPIT & RC UMRAXH, BARDOLI	Student
52	Chaudhari Jignesh H	SNPIT & RC UMRAXH, BARDOLI	Student
53	Karan Prafulbhai Timbadiya	SNPIT & RC UMRAXH, BARDOLI	Student
54	Shubham Kumar Mishra	SNPIT & RC UMRAXH, BARDOLI	Student
55	Patel Atishkumar Laxmanbhai	SNPIT & RC UMRAXH, BARDOLI	Student
56	Chaudhari Mitul Kumar Dansing Bhai	SNPIT & RC UMRAXH, BARDOLI	Student
57	Ujjaval Jitubhai Chaudhari	SNPIT & RC UMRAXH, BARDOLI	Student
58	Harsh Merai	SNPIT & RC UMRAXH, BARDOLI	Student
59	Gamit Arjunbhai Posalyabhai	SNPIT & RC UMRAXH, BARDOLI	Student
60	Chaudhary Mayur Gautambhai	SNPIT & RC UMRAXH, BARDOLI	Student
61	Smit Parikh	SNPIT & RC UMRAXH, BARDOLI	Student
62	Atul Solanki	SNPIT & RC UMRAXH, BARDOLI	Student
63	Viral Chaudhari	SNPIT & RC UMRAXH, BARDOLI	Student
64	Sabir Shaikh	SNPIT & RC UMRAXH, BARDOLI	Student
65	Patel Parinkuma R	SNPIT & RC UMRAXH, BARDOLI	Student
66	Neel H. Naik	SNPIT & RC UMRAXH, BARDOLI	Student
67	Ahir Aniket V.	SNPIT & RC UMRAXH, BARDOLI	Student
68	Arpitbhai Navinbhai Gamit	SNPIT & RC UMRAXH, BARDOLI	Student
69	Gamit Pratikkumar Pravinbhai	SNPIT & RC UMRAXH, BARDOLI	Student
70	Nirav Satishbhai Gamit	SNPIT & RC UMRAXH, BARDOLI	Student
71	Saiyad Sufiyan Mohammadibrahim	SNPIT & RC UMRAXH, BARDOLI	Student
72	Darshan Hosbet	SNPIT & RC UMRAXH, BARDOLI	Student
73	Khalasi Riddhikkumar Rajnikantbhai	SNPIT & RC UMRAXH, BARDOLI	Student
74	Samuel Joshua Saji	SNPIT & RC UMRAXH, BARDOLI	Student
75	Sarthak Chauhan	SNPIT & RC UMRAXH, BARDOLI	Student
76	Kele Sagar Anilbhai	SNPIT & RC UMRAXH, BARDOLI	Student
77	Gamit Ankurbhai Chandubhai	SNPIT & RC UMRAXH, BARDOLI	Student
78	Dhavalkumar Surendrabhai Chaudhari	SNPIT & RC UMRAXH, BARDOLI	Student
79	Yashkumar Harshadbhai Khatari	SNPIT & RC UMRAXH, BARDOLI	Student
80	Swapnil Gamit	SNPIT & RC UMRAXH, BARDOLI	Student
81	Twinkle Babubhai Chaudhari	SNPIT & RC UMRAXH, BARDOLI	Student



### S N Patel Institute of Technology & Research Centre, Umrakh

82	Gamit Anilbhai Divanbhai	SNPIT & RC UMRAKH, BARDOLI	Student
83	Dharmaraj N Parmar	SNPIT & RC UMRAKH, BARDOLI	Student
84	Nikhil Mansukhbhai Gamit	SNPIT & RC UMRAKH, BARDOLI	Student
85	Tejassinh Prakashsinh Parmar	SNPIT & RC UMRAKH, BARDOLI	Student
86	Parmar Milankumar Bhikhubhai	SNPIT & RC UMRAKH, BARDOLI	Student
87	Ankitkumar Anilbhai Gamit	SNPIT & RC UMRAKH, BARDOLI	Student
88	Gamit Tejas R	SNPIT & RC UMRAKH, BARDOLI	Student
89	Gamit Niranjanbhai Rajendrabhai	SNPIT & RC UMRAKH, BARDOLI	Student
90	Tejaskumar Sumanbhai Patel	SNPIT & RC UMRAKH, BARDOLI	Student
91	Shreyansh Bhusara	SNPIT & RC UMRAKH, BARDOLI	Student
92	Dahi Rajeshkumar Rathod	SNPIT & RC UMRAKH, BARDOLI	Student
93	Tailor Anshulkumar Hemantbhai	SNPIT & RC UMRAKH, BARDOLI	Student
94	Nishith Dipakbhai Patel	BVPIT(D.S) - Umrakh	Faculty
95	Dhruvinkumar Pareshbhai Patel	BVPIT(D.S) - Umrakh	Faculty
96	Tejaskumar.Bansilal Rana	BVPIT(D.S) - Umrakh	Faculty
97	Ashvinbhai Kantilal Mistry	BVPIT(D.S) - Umrakh	Faculty
98	Neelaykumar Shaileshbhai Patel	BVPIT(D.S) - Umrakh	Faculty
99	Kiran Mahant	BVPIT(D.S) - Umrakh	Faculty
100	Nikunj Kumar Amratbhai Lad	BVPIT(D.S) - Umrakh	Faculty
101	Jeenalkumar Jayeshbhai Patel	BVPIT(D.S) - Umrakh	Faculty
102	Jignesh R. Pandya	BVPIT(D.S) - Umrakh	Faculty
103	Shah Ronakkumar Sanjaykumar	BVPIT(D.S) - Umrakh	Faculty