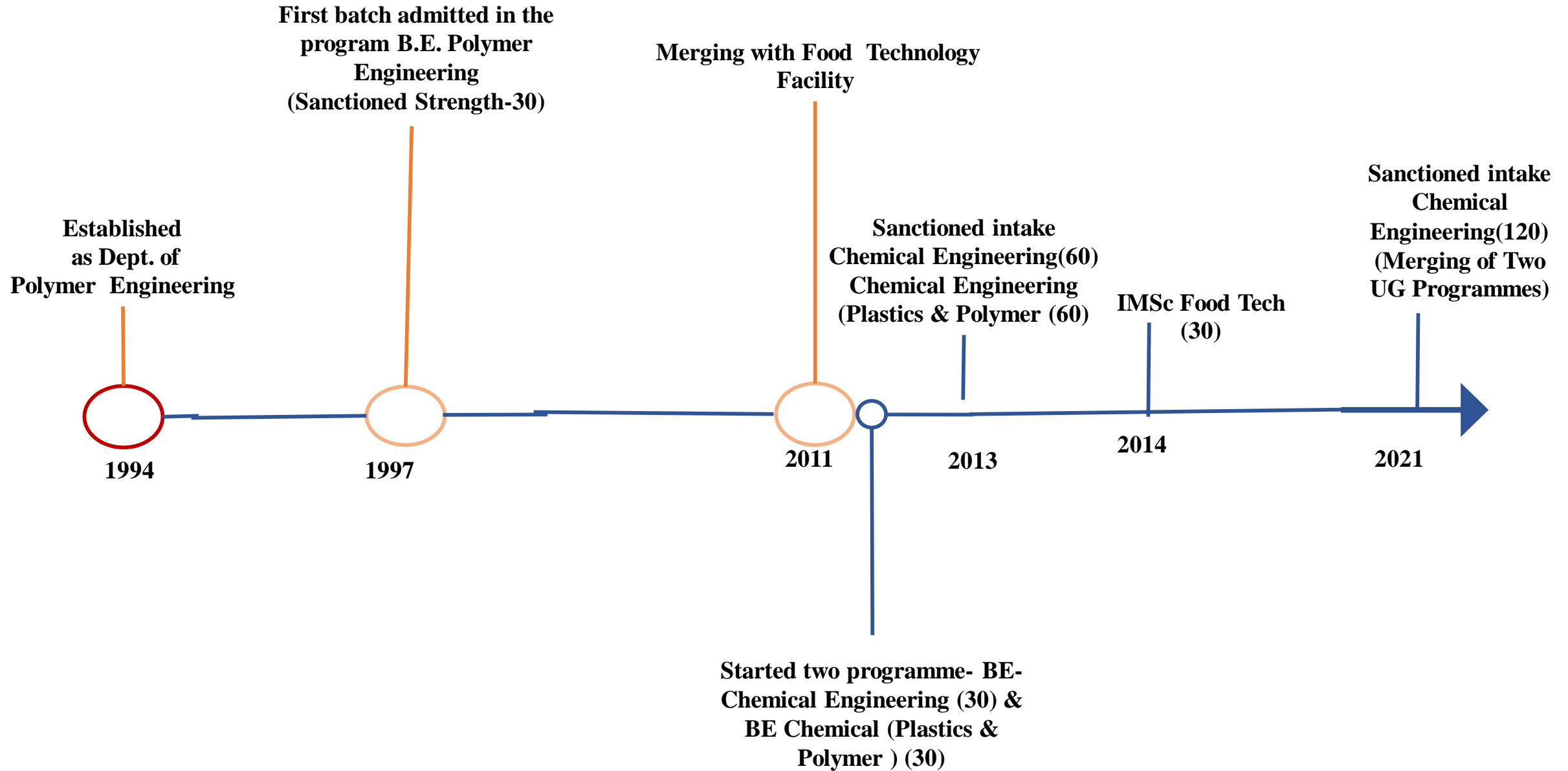


Chemical Engineering @ BIT Mesra:

Opportunity of Interdisciplinary Research in Chemical Engineering and allied areas



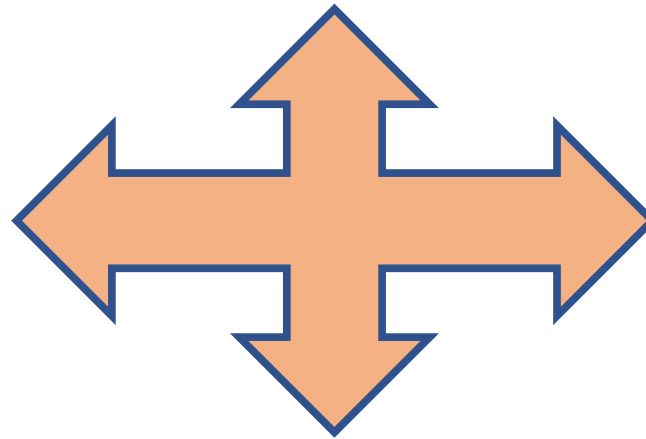
Department of Chemical Engineering



Department of Chemical Engineering

**PhD in Engineering &
Technology**

B. Tech: Chemical Engineering
NBA Accredited Till June 2022



**B. Tech: Chemical
Engineering(Plastics and Polymer)**
**(Merged with Chemical Engineering
with 120 Intake from 2021 Batch)**

**M. Tech: Chemical Engineering (Will start
from 2022 Batch)**

Int. M.Sc. Food Technology

- ❑ The Department received national recognition by winning the Gold Trophy for Plasticon Award 2012 in the category of Best Educational Institution Contributing to Plastics.
- ❑ The Department is also recognized under DST-FIST in 2011.
- ❑ Received 20 lakhs grant from AICTE on MODROBS scheme.
- ❑ Coordinating **Design development and Training centre** in plastics engineering in collaboration with Department of Industries, Government of Jharkhand (Grant Received Rs. 1 Crore)
- ❑ Received Rs. 100.00 lakhs grant from MOFPI & Department of Industries Gov. Jharkhand for the creation of Infrastructures facilities for running degree course in Food Technology
- ❑ Participated in several National level exhibition like Indplas Kolkata, Momentum Jharkhand

- ❑ Apart from manpower development, provides consultancy and testing facilities to Government agencies and plastics industries. Jharkhand government has recognized the Plastic Testing facility of the Department.



- ❑ Faculties are able to grab research grant from different funding agencies (DST-GOI, DST-GOJ, DRDO, DRDL-ANSP, MNRE, Coir Board etc). Has received more than 2 Crore grant in last four year.
- ❑ Dr. Akhil Sen won 2nd National Award in 2012 for "Technology Innovation in Polymeric Materials" by Ministry of Chemicals and Fertilizers, Government of India
- ❑ A strong industry academia collaboration. Faculties often collaborate with industries (IOCL, SAIL, BERGER PAINTS, TATA STEEL etc.) for UG projects with industrial relevance
- ❑ Faculty are continuously upgrading themselves with active participation in development/training activities/short Term Training Program . Also conducting workshop, conference and seminar in regular basis.



Department Achievement/ Recognitions

Student Level

Entrepreneur

Ritwik Sing (14-18) founder Ritz Bakers
Anshu Kumar Soni (13-17) founder of
Grabfocous Edutech

Shivank Roy (2012-16)
Co founder|CTO-Careerletics.com

Mr. Mukesh Chandra Anchuri(2006-10)
co founder Paymatrix

Academician

Dr. Anirudha Sing (97-2001 batch) Assistant
professor of Urology in the John Hopkins
University(Present adjunct Faculty)

Civil Service

Aparajita Sharma (2009-14) Officer Trainee -
Indian Administrative Services

At foreign University

Western University, University of Alberta,
University of Illinois, University of
Dartmouth, State University of New York

At Indian University

(IIT KGP, IIT Delhi,, IIT Chennai, IIT ,
IIM,etc)

At government Agencies

ISRO, DRDO, IOCL, ONGC

Industrialist

Mr. Saurabh Toshniwal (02-06) Director at
Royal Composites (Seals) Pvt. Ltd.

Industry

Samsung chemicals Thiland Ltd.
Altimetrik
Production Planning Analyst Amazon, IOCL,
Reliance, Starlite, JINDALCo, Vedanta





Prizes on the National Level Technical Festivals i.e.
Mind Over Matter, CHEMCON,,SHEMCON, Vortex, Sr-IDP

Prizes on the National Level NSS & Sports Competition

Prizes on the National Level design competition (Formula Bharat, Robocon,)

The Telegraph

Women's team from BIT-Mesra tops Tata all-India engineering contest
Oh boy, these girls fixed the problem

ANURAMA ROSE

Smiles lit up the stage at Mind Over Matter, a Tata Steel all-India engineering tournament challenge where grand finalists were held on Friday in Bangalore, www.gifs.

When the tough and rigorous Festivals, held over six days from BIT Mesra's National engineering department won Mind over Matter, Mesra's, taking home Rs 1 lakh, a trophy and more importantly pre-glitterous offers from Tata Steel.

Launched in 2013, Mind over Matter challenges engineering students to leverage to redefine the real product and manufacturing problems. The best ideas are given to Tata Steel for the ongoing projects.

On Friday, 12 women came for the final round of Mind over Matter at Centre for Excellence in Bangalore where V. Srinivasan, advisor to Tata Steel managing director T.V. Sureshbabu, was chief guest.

"We were excited because of the 12 finalists, there were only two women with girl participants. I am so happy we won. Great inspiring experience," said Kaurast. "It was hard thing to clear we have a pre-qualification job offer," she said her resume and brand visibility get boost to students.

So, what problems did they solve? "Without getting too technical about it, our problem was how to convert an offer to the real, which required designing and convert to real manufacturing," Kaurast said.

The one-time ITI Madhav team of Venkatesh Hari Prasad

second round and BIT Mesra's Anshu Narayan and Kishor also there. They won prizes of Rs 75,000 and Rs 50,000, respectively, and pre-glitterous offers.

The contest started very early in March, with online applications from over 500 teams across 30 engineering colleges. Students from engineering colleges had to choose a problem and think of a solution in an abstract. Further last teams across categories from the country were finally short listed to join Tata Steel at Bangalore. The two-months interesting round had on their respective problems solved with expert mentors for help and tips.

The 12 teams showcased their final presentations on Friday from which the winners made it to top finals and the best three were declared winners. Judges were Tata Steel executives with expertise in steel manufacturing.

From Bangalore where it started to take the top three and the whole India team was celebrating.

"The challenge in the company (Tata Steel) as a large entity. We came to know its culture and work culture. We were girls hired to get this future ready," said Poojashri Jaha, a third year BTech student from the University of Petroleum and Energy Studies, Dehradun.

"I'm motivated and we are happy to get an opportunity to work young minds. The girls (participants) were selected and were held in the factory. They were made to see the real world factory because most making in one of the core industries that contribute to the country's economy and total growth," he said.



Department Vision

To be a Centre of Excellence for providing effective teaching/ learning, skill development and research in the areas of Chemical Engineering and allied areas through the application of Chemical Engineering principles for the fulfilment of social and economic needs of the nation.

Department Mission

1. To educate graduate engineers with critical thinking skills in chemical engineering & allied areas who will be global leaders in industry and academia.
2. To inculcate fundamental knowledge base in undergraduate as well as post-graduate students which enables them to carry out further higher study, do innovative interdisciplinary doctoral research and to be engaged in long-life learning.
3. To train all UG, PG and PhD students of the department in addressing the challenges in chemical, petrochemical, refinery, polymer and allied industries by developing sustainable and eco-friendly technologies.

Faculty Information and Contribution



Faculty Information and Contribution





IIChe BIT Mesra



News & Publication





Dr. Gautam Sarkhel
Professor and Head



Dr. Sudipta Goswami
Professor



Dr. Akhil Kumar Sen
Associate Professor



Dr. Arup Choudhury
Associate Professor



Dr. G.T. Mohanraj
Associate Professor



Dr. Sumit K. Jana
Assistant Professor



Dr. Sudeepan Jayapalan
Assistant Professor



Dr. Pulak Datta
Assistant Professor



Dr. Amarnath Mishra
Assistant Professor



Dr. Ashok K Baranwal
Assistant Professor



Dr. Anand Bharti
Assistant Professor



Dr. Debasree Ghosh
Assistant Professor



Dr. Bidhan Chandra Ruidas
Assistant Professor



Dr. Yogendra Nath Prajapati
Assistant Professor



Dr. Anupam Roy
Assistant Professor



Dr. Amit Kumar Tiwari
Assistant Professor



Dr. Arnab Karmakar
Assistant Professor



Dr. Abhijit Mondal
Assistant Professor



Dr. Rohit Kumar
Assistant Professor



Prof. Subhabrata Ray
(Ex-Prof. IIT
Kharagpur)
Adjunct Professor



Prof. Chandan Guha
(Ex. Prof Jadavpur
University)
Adjunct Professor



Dr. Anuranjan Pandeya
(Scientific Digital
System)
Adjunct Faculty

Dr.Suwendu Bhattacharyay
(Ex-Chief Scientist CFTRI)
Adjunct Professor



Dr. Dan Bahadur (TEQIP
Faculty)
Assistant Professor



Dr. Nirupama (TEQIP
Faculty)
Assistant Professor



Mr. G RAVI KUMAR (TEQIP
Faculty)
Assistant Professor



Chemical Engineering Laboratory-I
Mechanical Operations and Fluid Mechanics

Chemical Engineering Laboratory-II
Heat and Mass Transfer



Process Control Laboratory



Reaction Engineering Laboratory



Energy Engineering Laboratory



Computational Laboratory





Post Graduate Laboratory



Chromatography Laboratory



Food Technology Laboratory



Project and Research Laboratory-II



Project and Research Laboratory-I



Project and Research Laboratory-III
&
Synthesis Laboratory

Research Contributions

❑ Infrastructural Grant Received from DoI, MOFPI, DST-FIST, AICTE-MODROBS (Rs Lakhs) : 282.00

❑ R&D project Completed (Rs Lakhs) : 176.00
(DST, AICTE, UGC, DRDO, MNRE, Coir Board)

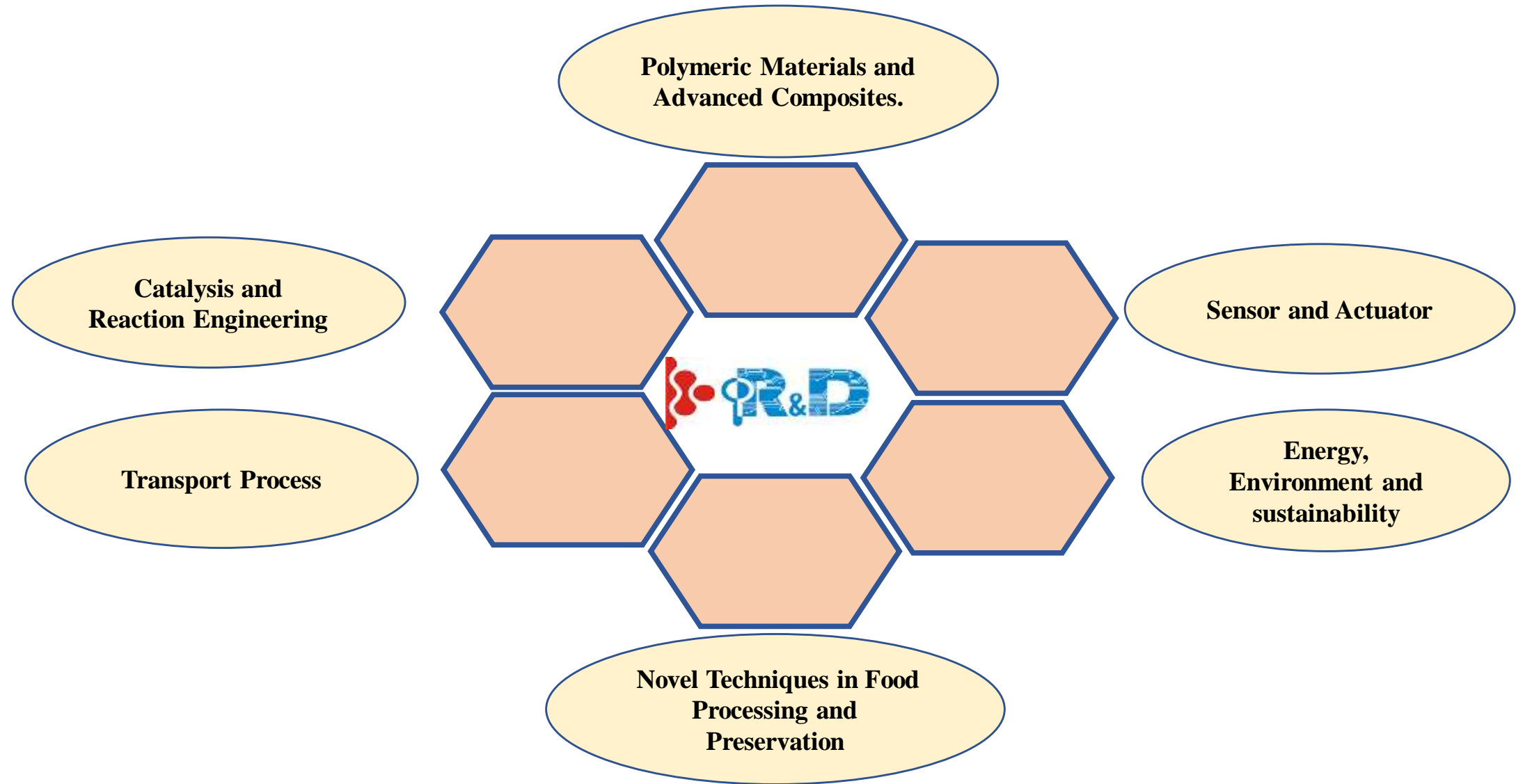
❑ Ongoing project from R&D Grant Received (Rs Lakhs) : 253.14
(DST, ICMR, DBT, AICTE-CRS)

❑ Approved R&D project yet to Received financial grant (Rs Lakhs) :137.00
(DRDO, ICMR)

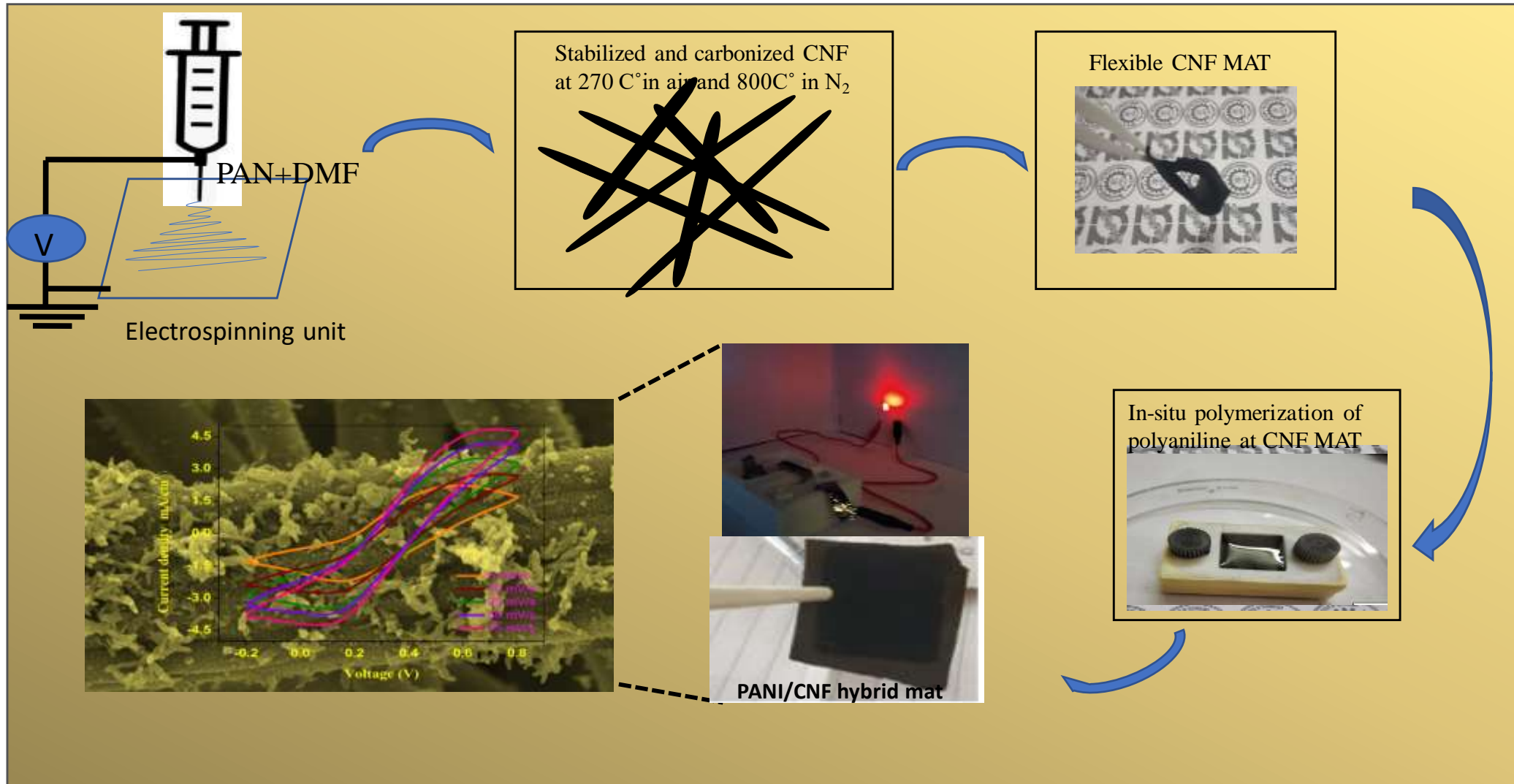
❑ No of R & D Project Submitted :15
ISRO, DST, Ministry of Mines, CCL

❑ Number of papers in SCI & SCOPUS Journals during Jul,2018-Dec, 2021 :70

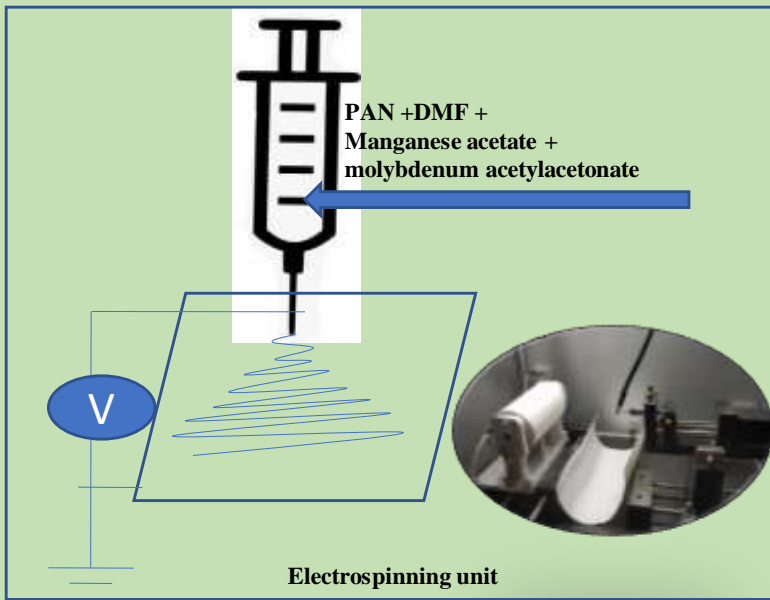
Area of Research



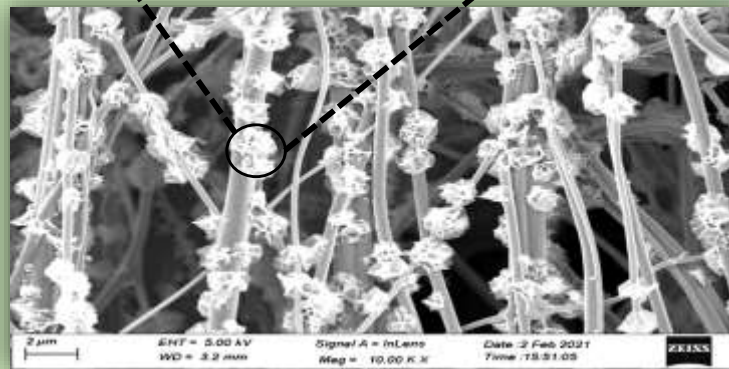
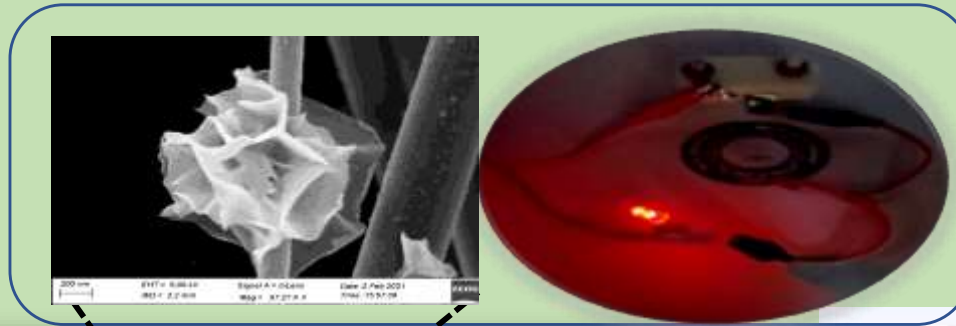
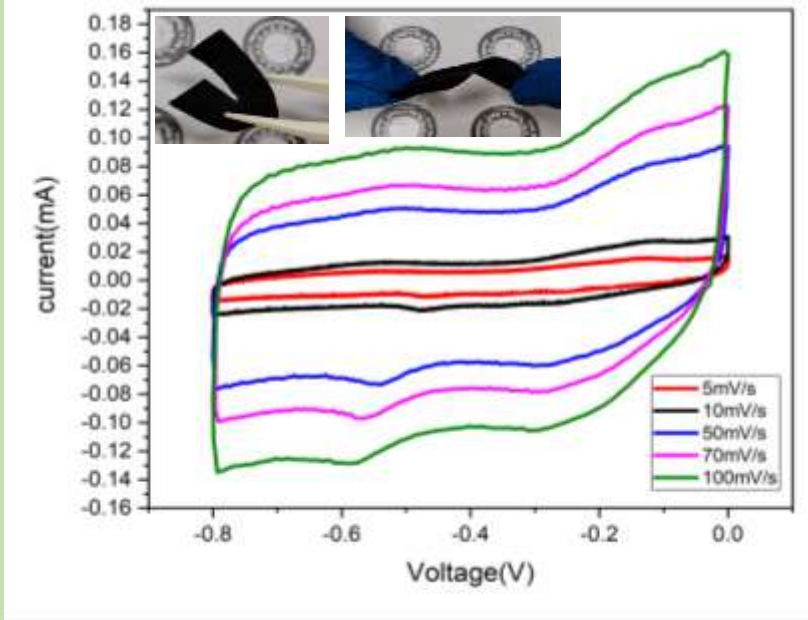
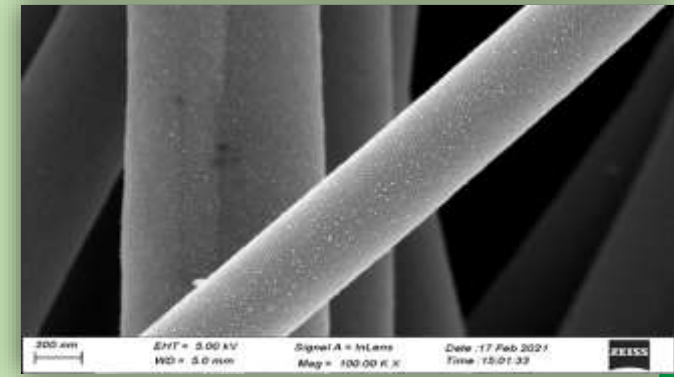
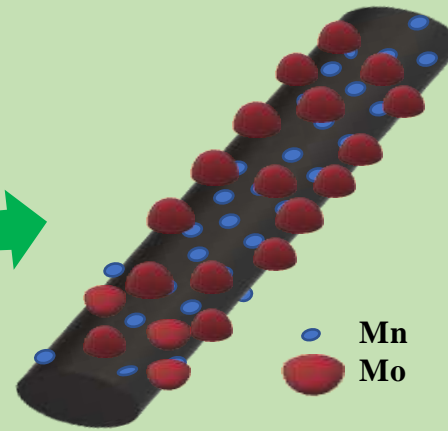
Energy, environment and sustainability



Scheme of polyaniline doped carbon nanofiber based electrode for supercapacitor application



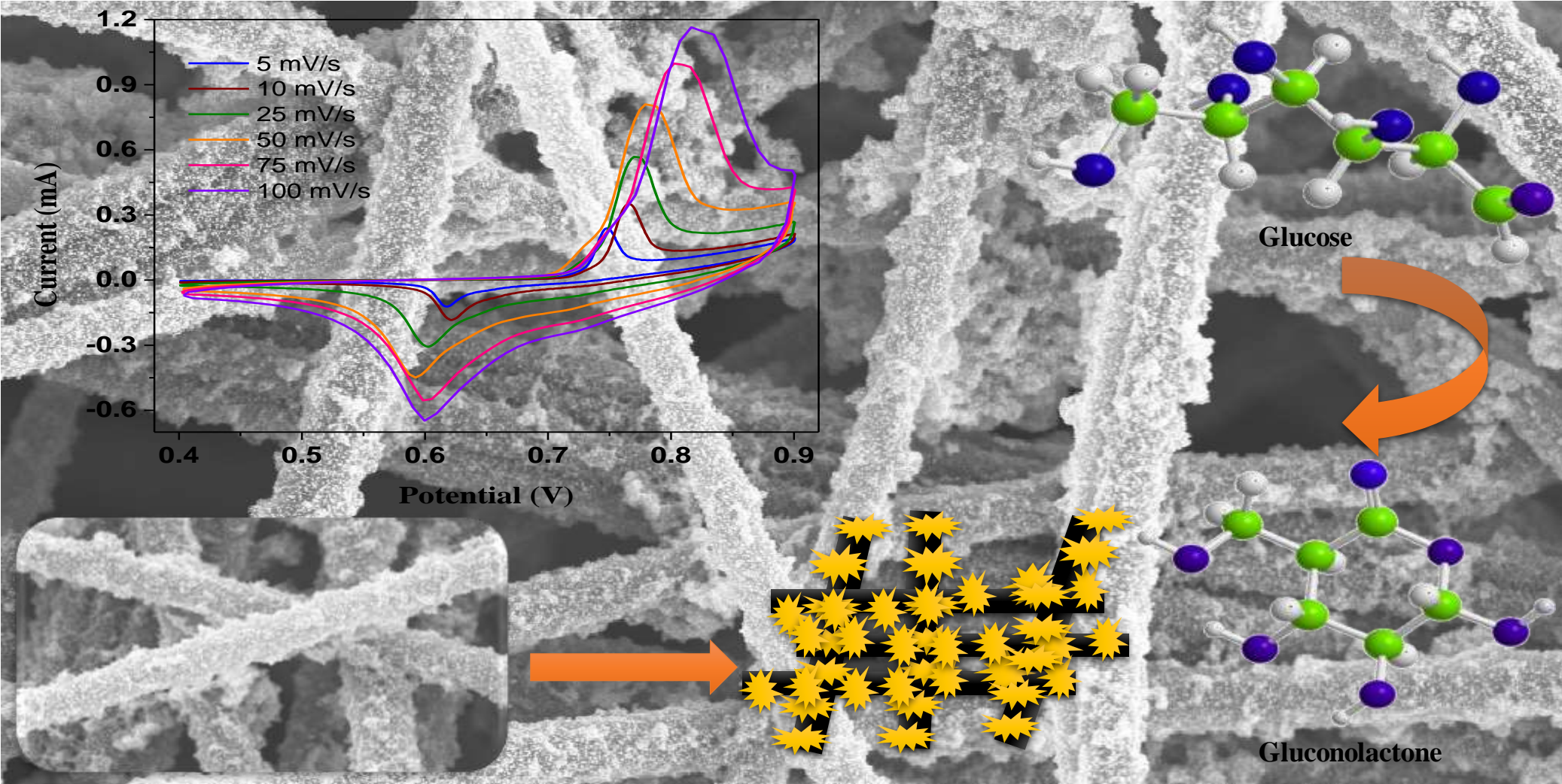
Stabilized and carbonized



Autoclave
Synthesis of MnMo₄ nanoflower
encapsulated at CNF

Solvothermal sulfurization at 140°C for 15h
Mn, Mo-C doped CNF +
Thioacetamide + ethanol

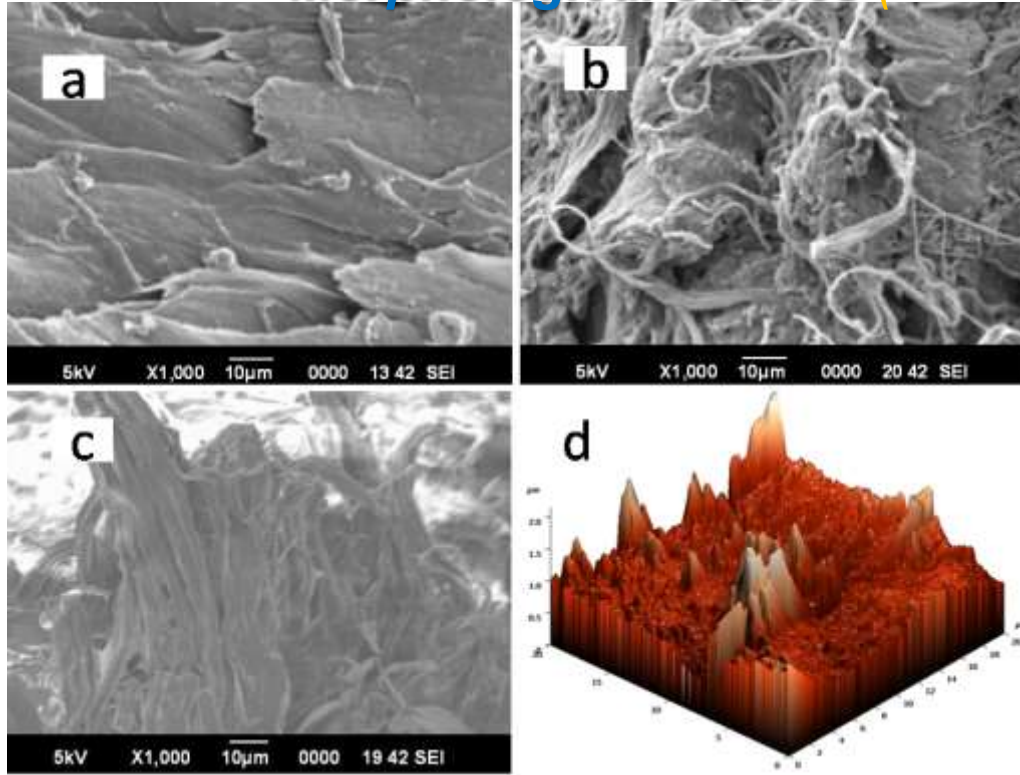
Glucose Sensor



Low cost environment friendly silica based fire retardant additive for polymer composite has been developed. This can be applicable for low temperature curable DGEBA resin and liquid amine cured epoxy composites. This type of product is not available in the market where silica filler can help in fire retardant properties.



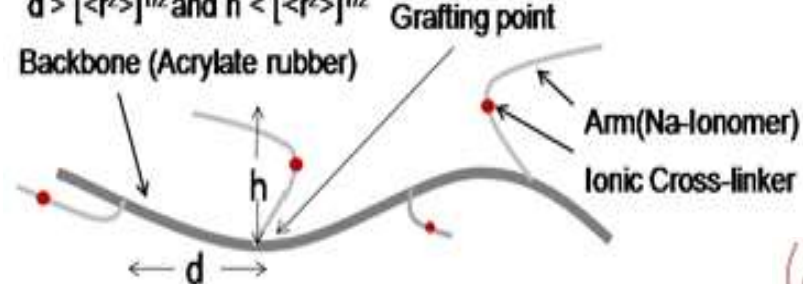
Morphological Studies (ASA/Na-ionomer Blends)



Case-I (Na-ionomer content $\leq 30\%$)

'Mushroom Regime' for N10, N20 & N30 Blends

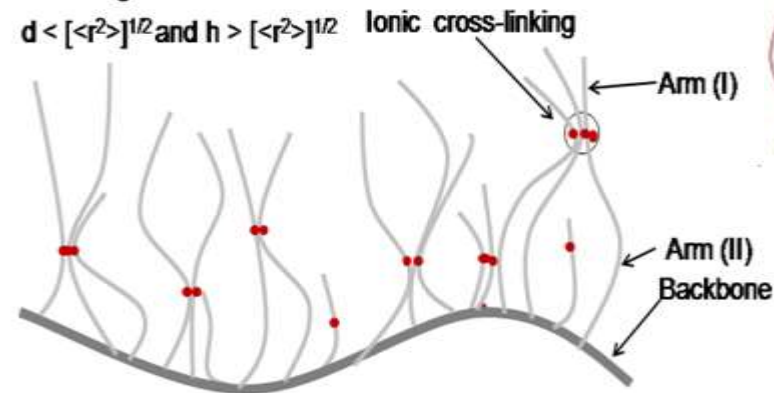
$$d > [\langle r^2 \rangle]^{1/2} \text{ and } h < [\langle r^2 \rangle]^{1/2}$$



Case-II (Na-ionomer content $> 30\%$)

'Brush Regime' for N40 & N50 Blends

$$d < [\langle r^2 \rangle]^{1/2} \text{ and } h > [\langle r^2 \rangle]^{1/2}$$

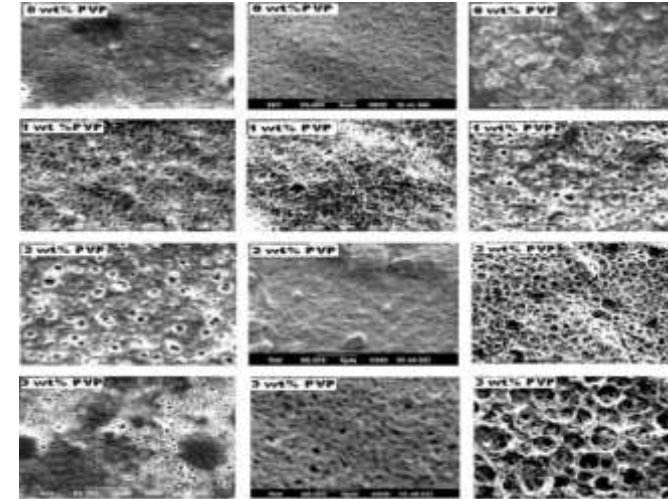


Morphologies of ASA/Na-ionomer system: (a) SEM of A100 polymer, (b) SEM of N30 blend, (c) SEM of N40 blend, and (d) AFM of N40 blend.

- Ionomer content $< 30\%$, the ionomer chains were present in 'lying' condition on ASA matrix phase – 'Mushroom' formation
- Ionomer content $> 30\%$, the ionomer chains were present in 'standing' condition - 'brush' formation
- AFM study shows 'Peak and valley' type surface topology for 'brush' regime

Polymeric materials and advanced composites.

Development of Polymeric Hybrid Membrane for Heavy Metal Separation from Water



Development of surface coating compositions based on shellac-synthetic resin/ polymer blends



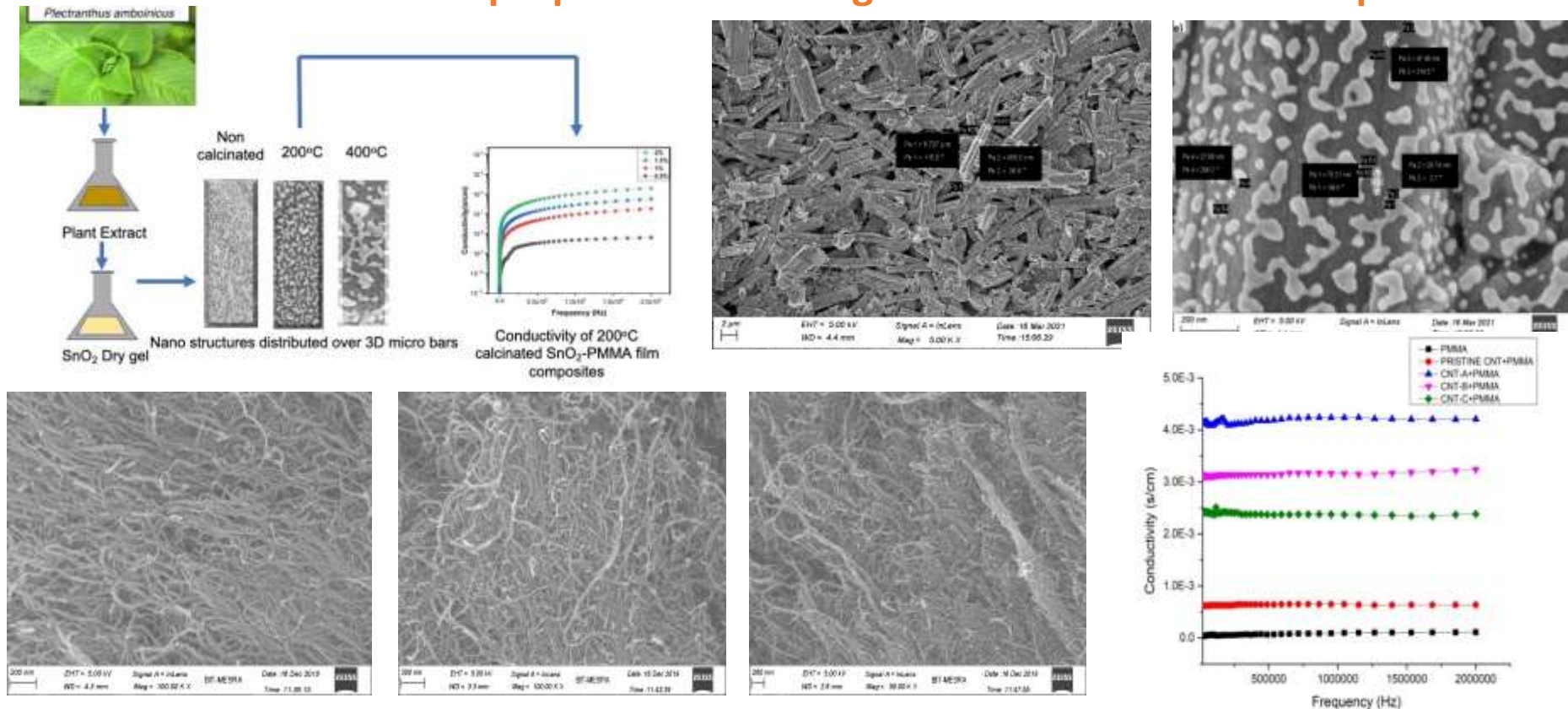
Development of conducting polymer nanocomposites for sensing applications

Objectives: 1. Preparation of electrically conducting polymer nanocomposites (organic/inorganic/hybrid) films using PMMA, cellulose acetate as polymer matrices and using MWNT, SWNT, SnO₂ and Au nanoparticles as conducting fillers.

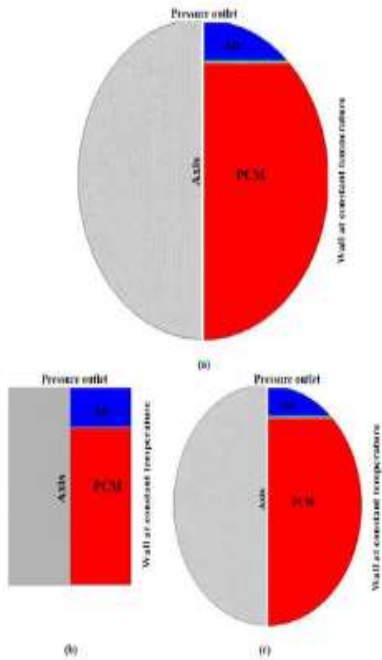
2. Functionalization and characterization of CNTs.

3. Chemical and green synthesis of SnO₂ and their characterization.

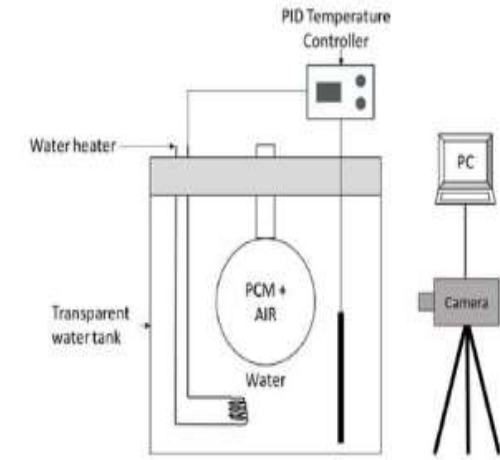
3. Evaluation of electrical properties & sensing behavior of the nanocomposites.



Transport process



cavities of various shape and size



Experimental setup

Governing equations

Continuity equation:

$$\frac{\partial \rho}{\partial t} + u_i \frac{\partial \rho}{\partial x_i} = 0$$

Momentum equation:

$$\frac{\partial}{\partial t}(\rho u_i) + \frac{\partial}{\partial x_j}(\rho u_j u_i) = \mu \frac{\partial^2 u_i}{\partial x_j \partial x_j} - \frac{\partial p}{\partial x_i} + (\rho - \rho_{ref})g + S_i$$

γ is defined as follows:

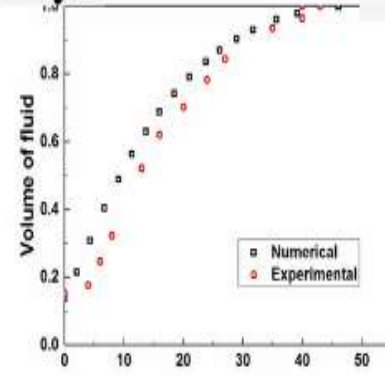
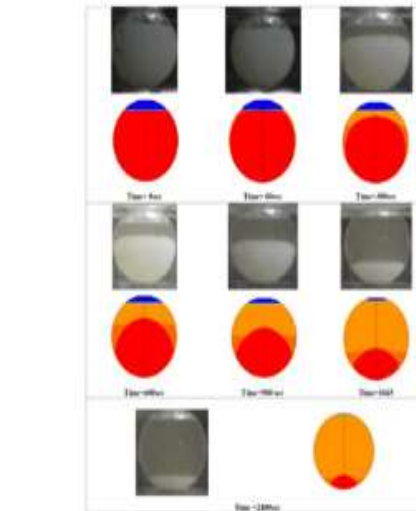
$$S_i = -\lambda_{melt} \frac{(1-\gamma)^2}{\gamma^3 + \epsilon} u_i$$

$$\left. \begin{aligned} \gamma &= 0 \text{ at } T < T_c \\ \gamma &= \frac{T - T_c}{T_m - T_c} \text{ at } T_c < T < T_m \\ \text{and } \gamma &= 1 \text{ at } T > T_m \end{aligned} \right\}$$

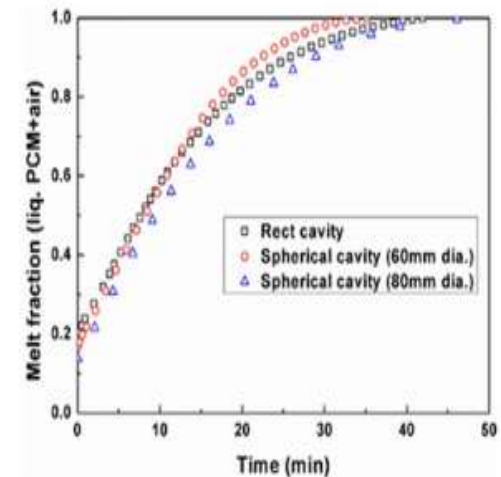
Energy balance equation:

$$\frac{\partial}{\partial t}(\rho h) + \frac{\partial}{\partial x_i}(\rho u_i h) = \frac{\partial}{\partial x_i} \left(k \frac{\partial T}{\partial x_i} \right)$$

Numerical model



Model validation

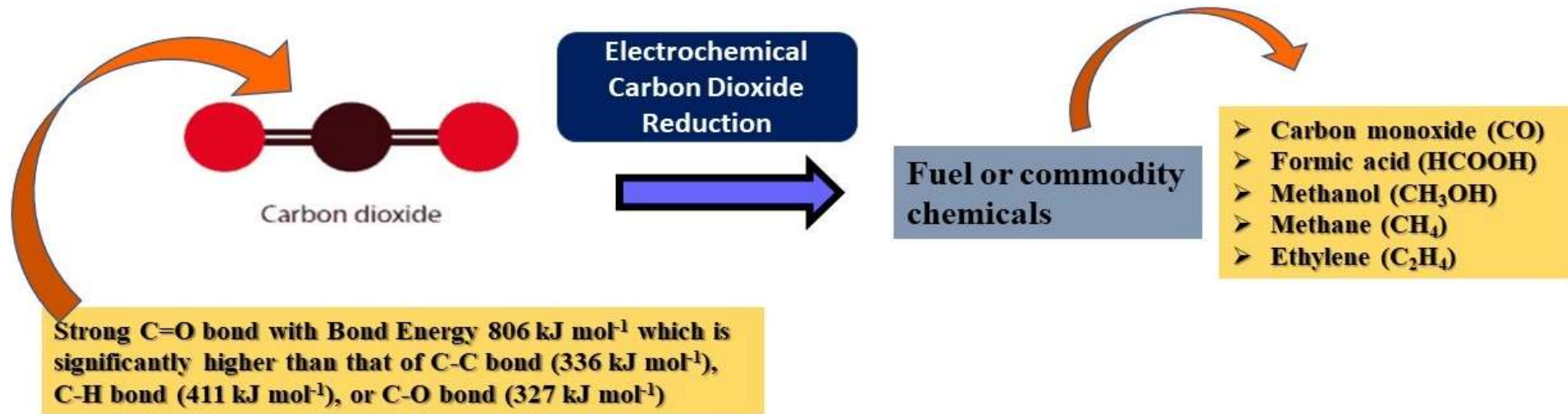


Results

CFD analysis of Phase change material for latent heat energy storage

Transport process

Electrochemical reduction of carbon dioxide to valuable products



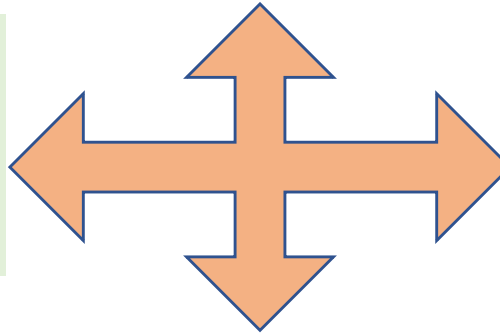
Novel techniques in food processing and preservation

Area of Research



□ Physicochemical modification of native cereals for their utilization in micronutrient and bioactive delivery

Addressing Micronutrient Deficiencies through Rice and Rice Based Product Fortification

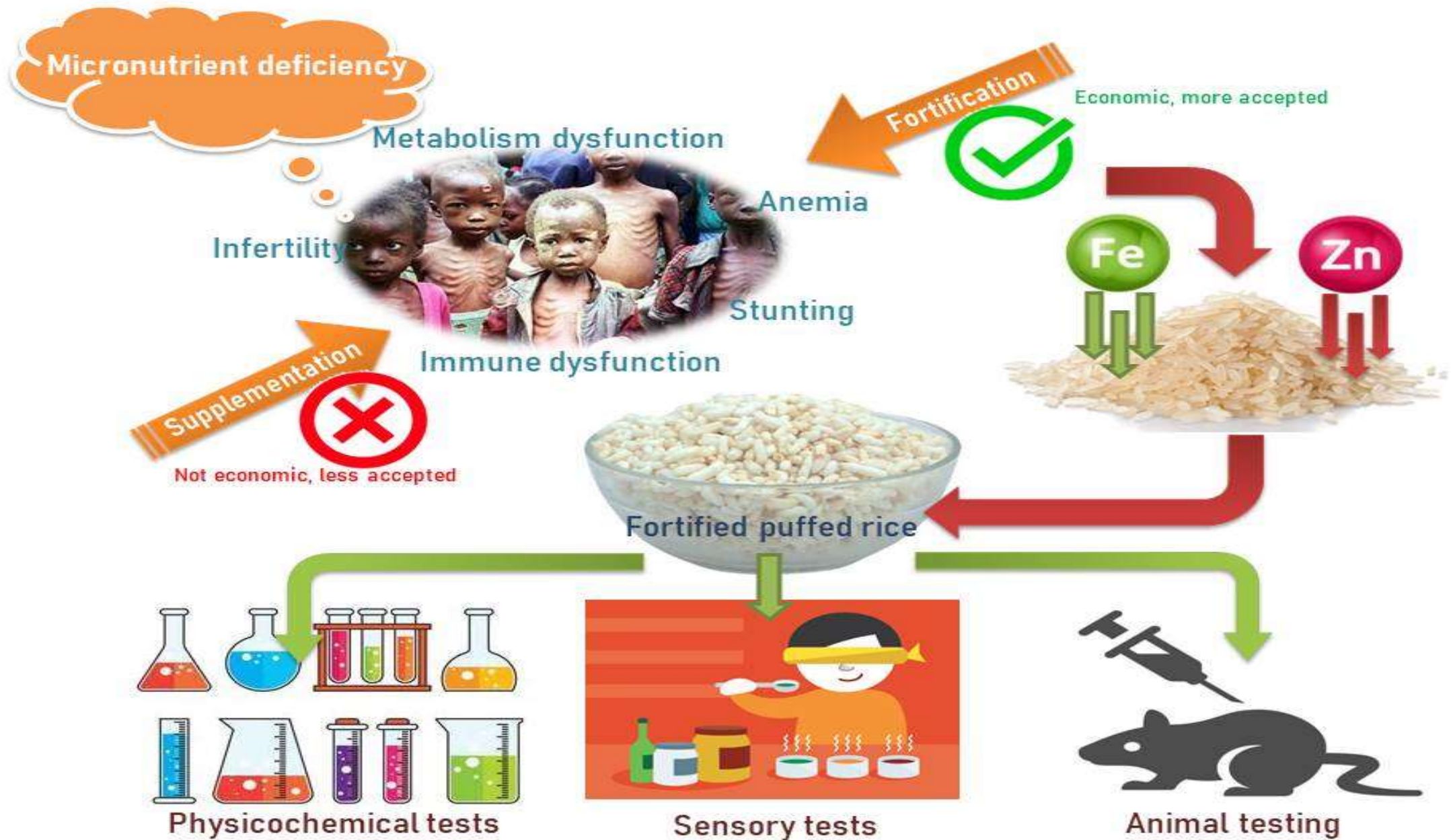


Development of process technology for enhanced resistant starch content in rice and rice based snack (Puffed rice)

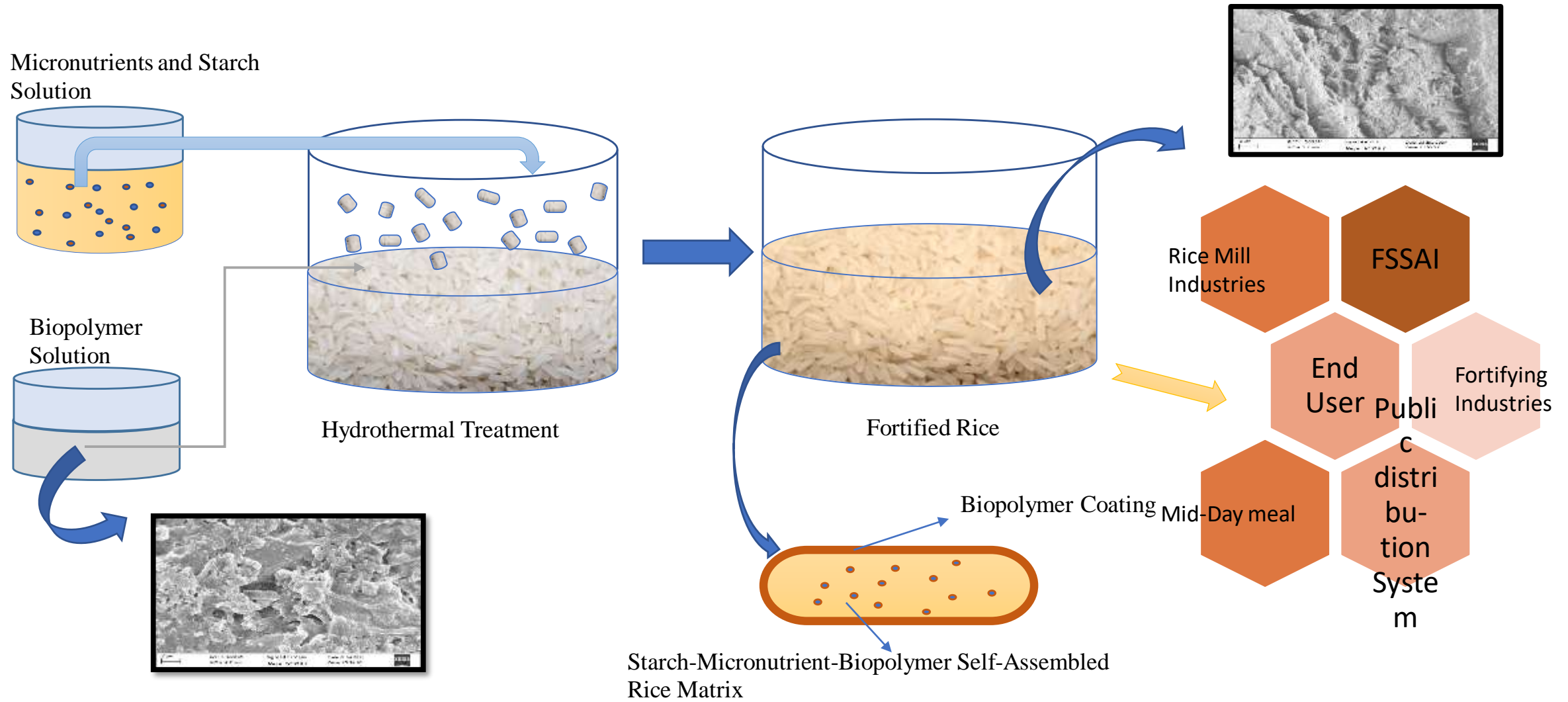
Starch based porous carrier for bioactive ingredient delivery



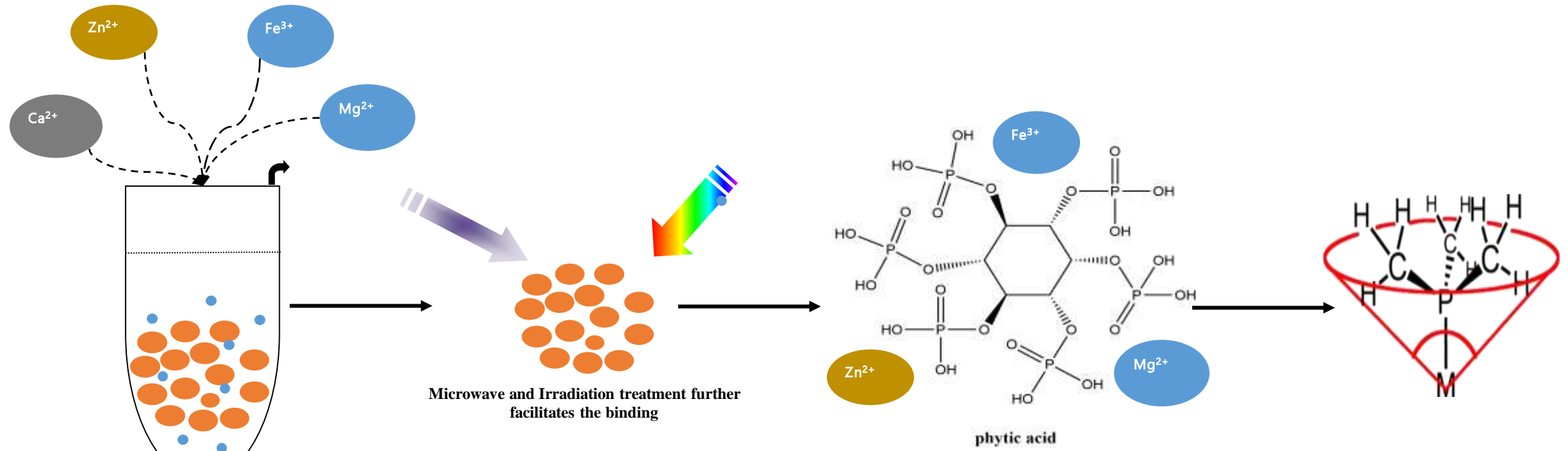
Novel techniques in food processing and preservation



Novel techniques in food processing and preservation



Novel techniques in food processing and preservation



Vacuum soaking of pulses with additional metal salts (e.g. NaFeEDTA , CaCl_2 , ZnSO_4) for selective binding with native phytic acid.

Microwave and Irradiation treatment further facilitates the binding

Formation of metal-phytate complexes thus availability of free IP6 reduced for further hindering of micronutrients in human body

Application in production of fortified pulses in Dal or Pulses processing industries

Thank You