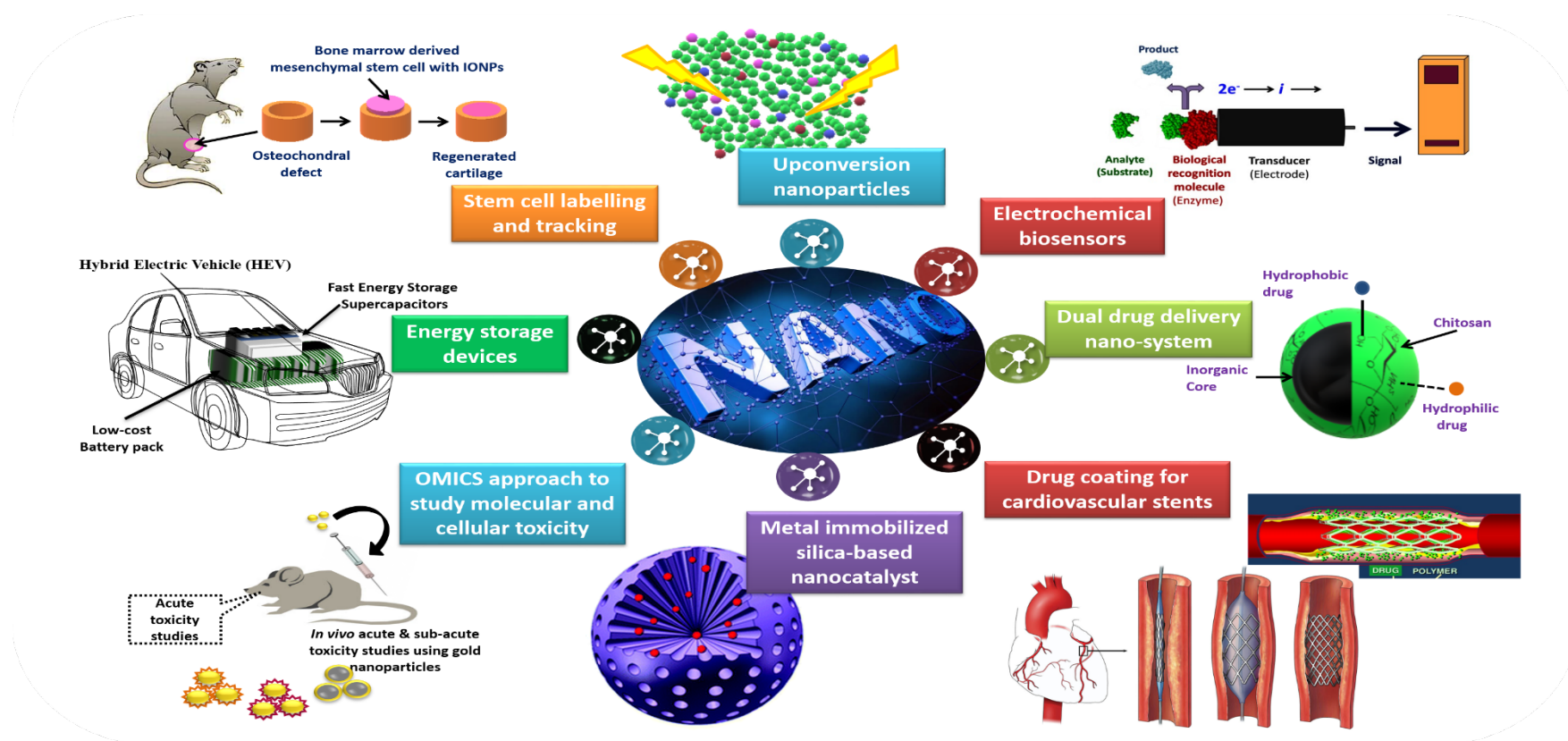


## MATERIALS RESEARCH GROUP



## MEET THE TEAM



Dr. SUDESHNA CHANDRA

Humboldt Fellow and Professor in Chemistry  
Area of Specialization: Material Chemistry  
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RUCHITA SHELAT

This study was to develop biocompatible magnetic iron oxide nanoparticles that can be used as a cell labeling and tracking agent for bone marrow derived mesenchymal stem cells. We believe that the current project will serve dual purpose for articular cartilage regeneration using BMSCs and its subsequent imaging using magnetic nanoparticles via MRI.



PRIYAL CHIKHALIWALA

Biosensors offer capability of rapid detection of sample analytes. Magnetic ( $Fe_3O_4$ ) nanoparticles (NPs) were surface functionalized with different generations of poly-amidoamine dendrimers. For biosensing, two liver cancer biomarkers were detected and validated using human serum samples. Ink-jet printing of NPs was also studied.



GITA SINGH

To develop a low-cost supercapacitor based on conducting polymer and metal ferrite nanoparticles with high cycle stability, moderate power and energy density and high specific capacitance. These nanocomposites can be used as stable electrode material in ultra-high-rate energy storage technologies like batteries and supercapacitors.



MANGESH SAKHALKAR

To design novel chloroaluminate ionic liquid with green synthetic method. Elucidation of cationic and anionic moieties and investigation of its physicochemical properties. Applications in synthesis of industrial important substituted arenes using novel ionic liquids to provide energy efficient synthetic routes.



AISHWARYA SHETTY

Project involves the fabrication of novel drug delivery systems based on inorganic composite nanomaterials for treatment of cancer. The objectives of these drug delivery systems range from combinational drug delivery and stimulus based responsiveness to target specificity and imaging.



MEENAKSHI SHUKLA

To synthesize chiral metal catalyst & magnetic mesoporous silica & to immobilize the catalyst into the silica matrix. Catalyst characterization to understand the interaction of the catalyst into the matrix. Optimization & mechanistic studies of the catalyst into asymmetric transfer hydrogenation reaction & coupling reactions.



HIRAL KHAKHAR

Present work is aimed at understanding the cellular and molecular effects in human cells triggered by gold nanospheres. Gene & protein expression analysis can provide valuable information on molecular changes & events inside the cell that are caused due to nanotoxicity.



PINKY SHAH

To fabricate gold nanoparticles embedded with antiproliferative drug for elution of polyesteramide coating in cardiovascular stent. a DES associated with more predictable and uniform pattern of endothelialization, alongside a polymer that disappears after release of the antiproliferative drug, potentially allows more flexible and confident use of shorter periods of mandatory dual antiplatelet therapy (DAPT).



NEHA DUBEY

The project involves designing of a suitable mesoporous matrix for encapsulating the UCNPs and the therapeutic agent (drug). The synthesis of the UNPs@mesoporous matrix is carried out to ensure flexibility in modulating the particle size, shape, doped ions, and emission profile of the nanoparticles. The photothermal effects for manipulating drug delivery by suitable laser will be studied.

## PUBLICATIONS (2020)

- M. Shukla, K. C. Barick, G. S. Salunke, S. Chandra, Chiral salen - Ni (II) based spherical porous silica as platform for asymmetric transfer hydrogenation reaction and synthesis of potent drug intermediate montekulast, *Molecular Catalysis* (2020); just accepted)
- P. Chikhaliwala, W. Schlegel, H. Lang, S. Chandra, Inkjet printed patterns of polyamidoamine dendrimer functionalized magnetic nanostructures for future biosensing device application, *Journal of Material Science* (2020) DOI : 10.1007/s10853-020- 05639-7
- A. Shetty, S. Chandra, Inorganic hybrid nanoparticles in cancer theranostics: understanding their combinations for better clinical translation, *Materials Today Chemistry* (2020) 18, 100381
- J. Rao, A. Chandrani, A. Powar, S. Chandra, Preparation, characterization and release behaviour study of oxyfluorfen polyurea capsules: Phytotoxicity study on Paddy crop, *Designed Monomers and Polymers* (2020) <https://doi.org/10.1080/15685551.2020.1816344>
- R. Shelat, L. K. Bhatt, B. Paunipagar, T. Kurian, A. Khanna, S. Chandra, Regeneration of hyaline cartilage in osteochondral lesion model using L-lysine magnetic nanoparticles labeled mesenchymal stem cells and their *in vivo* imaging, *Journal of Tissue Engineering and Regenerative Medicine* (2020) DOI:10.1002/term.3120
- M. Sakhalkar, R. P. Choudhury, V. Bhakthavatsalam, S. V. Lande, J. Pradhan, S. Chandra, Deep compositional understanding of TBA:AlCl<sub>3</sub> ionic liquid for its applications, *Journal of Molecular Structure* (2020) 1222, 128936
- M. Sakhalkar, S. Lande, S. Chandra, Facile and selective mono benzylation of naphthalene using atom efficient chloroaluminate ionic liquid, *Polycyclic Aromatic Compounds* (2020) <https://doi.org/10.1080/10406638.2020.180230>
- G. Singh, S. Chandra, Nano-flowered manganese doped ferrite@PANI composite as energy storage electrode material for supercapacitors, *Journal of Electroanalytical Chemistry* (2020) 874, 114491
- P. Chikhaliwala, S. Chandra, Poly-amidoamine dendrimers@Fe<sub>3</sub>O<sub>4</sub> based electrochemiluminescent nanomaterials for biosensing of liver cancer biomarkers, *Electroanalysis* (2020) <https://doi.org/10.1002/elan.202060075>
- M. Sakhalkar, P. Aduri, S. Lande, S. Chandra, Single step synthesis of novel chloroaluminate ionic liquid for green Friedel-Crafts alkylation reaction, *Clean Technologies and Environmental Policy* (2020) 22, 59–71

## GROUP ACHIEVEMENTS

- Ruchita Shelat received third prize in Oral presentation in 1<sup>st</sup> Student Research Congress under the scheme 'Innovations for Better Health', 2020.
- Priyal Chikhaliwala received Best Paper Award for Poster presentation in "International Conference on Electrochemistry" (EIHE 2020), Bhabha Atomic Research Centre (BARC), 2020.
- Pinky Shah received DST Women Scientist Scheme A in 2019.
- Aishwarya Shetty received Best Oral Talk award at 'National seminar on shaping the future with Nanoscience and technology' organized by KBP college, 2019.
- Aishwarya Shetty received Women Graduates Union Scholarship (2018-2019).
- Ruchita Shelat received DBT fellowship, 2018.
- Priyal Chikhaliwala received In Pro TUC fellowship to work in Germany from July 2018 to September 2018.
- Priyal Chikhaliwala received iPUR fellowship to work in Germany from January 2018 to March 2018.
- Aishwarya Shetty received DBT fellowship, 2018.
- Gita Singh became one among the top 5 finalists of EURAXESS Science Slam India 2018.
- Gita Singh invited as a speaker at IIT Bombay to give a talk on Supercapacitors, organized by Mumbai Science Talk, Energy Club, 2018.
- Gita Singh and Sudeshna Chandra filed a patent titled, 'Mixed metal ferrite nanoparticle and method of synthesis thereof' at Indian Patent Office, 2018.

13. Gita Singh became EURAXESS India Ambassador in 2018.

14. Ruchita Shelat received DST Women Scientist Scheme A in 2017.

## NEWS

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Ruchita Shelat defended her PhD thesis on 13<sup>th</sup> January 2021.

Gita Singh got Post-Doctoral position in University College Dublin, Ireland, 2020.

Gita Singh appointed as a Research Associate at IIT Bombay, 2019.

Priyal Chikhaliwala appointed as Research Assistant under DST Nanomission sanctioned project, 2018-2019.