Snigdha Thakur received her BSc and MSc (Physics) in 2003 at Banaras Hindu University, Varanasi, India and Ph.D. (Physics) in 2009 from Indian Institute of Technology Madras, India. After post-doctoral work at University of Toronto, Canada, Snigdha joined IISER Bhopal in 2011.

**Research Description**

We aim to design and understand the micro- and nanoscale motors propelled by self-generated forces. While the ability to design motors in varied geometries with unique properties is well established, the capacity to precisely control the placement and transport of objects at this length scale is much more limited. We develop methodologies for the controlled motion of a single and an ensemble of nanomotors.

Recently, we have investigated the collective dynamics of ensembles of chemically powered sphere dimer motors. Sphere dimers are self-propelled nanomotors built from linked catalytic and noncatalytic spheres. They consume fuel in the environment and utilize the resulting self-generated concentration gradients to produce directed motion along their internuclear axes. The collections of such motors, under nonequilibrium conditions, is found to self-assemble transient aggregates with distinctive structural correlations and exhibit swarming where the aggregates propagate through the system.

These systems provide an opportunity to explore mechanisms of chemomechanical energy transduction and offer a link to self-propelled particles in living systems. Such molecular motors are an interesting topic of research because of their potential applications as vehicles for drug delivery, cargo transport, motion-based biosensing, nanoscale assembly, targeted synthesis, nano and microfluidics, etc.

**Selected Publications**

- Shear Induced Ordering in Branched Living Polymer Solutions Snigdha Thakur, Prathyusha K. R., Abhijit P. Deshpande, Mohamed Laradj and P. B. Sunil Kumar; Soft Matter, 60, 489 (2010)
- Coarsening through Directed Droplet Coalescence in Fluid-Fluid Phase Separation; Snigdha Thakur, Pramod A. Pullarkat and P. B. Sunil Kumar; Phys. Rev. E, 80, 011708 (2009).