based therapeutic formulations.

| Synopsis Seminar | |
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| Seminar Title | : Optimization of metal oxide nanoparticle-induced conformational dynamics and associated flocculation of α -Synuclein and RNA for biological applications |
| Speaker | : Sonali Mohanty (Rollno : 519ls1007) |
| Supervisor | : Suman Jha |
| Venue | : LS office |
| Date and Time | : 05 May 2025 (6:15 PM) |
| Abstract | The advent of nanotechnology has been immense in recent times in biomedical research, especially for using metal nanoparticle due to its tunable size and surface physicochemical properties. The prominence of metal nanoparticles in physiological environment needs to be assessed thoroughly to understand the subsequent changes after its exposure to a multifaceted biological system. The biomolecules as per their affinity and concentrations in the biological system, interacts with the nanoparticle interface, resulting in a continuous process of adsorption and desorption. This leads to formation of dynamic nano-corona that decides dispersivity and cytotocompatibility of the nanoparticle. Thus, the interactions of protein or RNA biomolecules (relatively dynamic biomolecules of cytosol) with metal nanoparticle surfaces provides valuable insights about its interfacial behaviour in biological mileu. Moreover, the effect of such interactions help in understanding the associated conformational changes in biomolecules that can either be beneficial or detrimental. The current work explores the influence of metal oxide nanoparticle on conformational dynamics and associated biomolecule-nanoparticle complex formation, i.e., flocs formation. The work initially focused on the interactions of bare and surface functionalised zinc oxide nanoparticles (ZDONPs) with intrinsically disordered protein (IDP), like α -synuclein (α S), which upon misfolding leads to onset/progression of Parkinson&rsquos disease. The findings provide insights on ZnONP-mediated mitigation of protein brokegenerative disease. The glycation of protein in a con-erzymatic process and the subsequent formation of reactive oxygen species further leads to advanced glycation end-products formation. Therfore, the second objective of the thesis focused on understanding the effect of ZnONP interfaces on moderating aS glycation and consequential formation of znONP surfaces reduces the extent of glycation by sterically inhibiting the initial interaction between the oxidat |

RNA with iron oxide nanoparticle (FeONP) and the resulting complexes&rsquo stability in presence of RNase A nuclease. Like the IDP, the adsorption of RNA onto FeONP surface entropically traps the biomolecule into flocs and exhibited conformational stability against RNase A mediated degradation due to steric hindrance. Thus, the overall work indicated that the optimized interfacial interaction, via moderating physicochemical properties of the nanoparticle, with biomolecules, like α S and RNA leads to flocs formation. Therefore, it can be used in nanoparticle-based approaches for biological applications to likely delay the onset/progression of PD or to enhance the shelf-life of RNA-