National Institute of Technology Rourkela

Progress Seminar

Seminar Title	: Impact of Self-Assembly and Intrinsic Electron Relay Stations on Ferritin Functionality
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Venue	: Chemistry Seminar Room (MC-319) in Hybrid Mode
Date and Time	: 14 Aug 2024 (11 AM)
Abstract	: Despite being an indispensable co-factor for myriad essential life functions, excess iron is toxic. To maintain the balance between its essentiality and toxicity, nature has devised a self-assembled spherical nanocaged protein - &lsquoferritin&rsquo - that can store up to ~4500 iron atoms, reversibly, in the form of hydrated ferric oxyhydroxide mineral and facilitate controlled iron release to support physiological processes. The self-assembly of ferritin cages dictate the overall architecture of the protein complex. However, the molecular mechanisms driving the self-assembly of ferritin, the intermediates involved and the participating factors remain under-examined owing to the difficulty in isolation of folded assembly units. Uncovering the conserved interactions that promote/control this self-assembly could be exploited for diverse biomedical applications. Therefore, this study aims to unveil the factors influencing the self-assembly of ferritins and explore the consequences of self-assembly on its natural functions: iron sequestration, rapid ferroxidase activity, iron storage and release. Simultaneously, the ferroxidase/mineralization activity of ferritin and its mineral dissolution involves a complex interplay of redox reactions, possibly through long range electron transfer (ET), in multiple steps, *via* various electron relay stations (i.e., heme and intrinsic redox active amino acids of protein cage). Therefore, in addition to the self-assembly phenomena, the study also aims to pursue the ET pathways in ferritin by rational protein engineering and rapid kinetics to better understand its rapid ferroxidase and iron-mineralization activity.