

Seminar

Strategies for Detection and Strain-Selective Antibacterial Activity of Functionalized Nanomaterials

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Material-based antibiotics offer a promising alternative to conventional drugs in combating antimicrobial resistance, yet Gram/strain-level selectivity remains largely unexplored for nano-antibiotics. Here, we demonstrate multiple strategies to tune the surface chemistry of functionalized nanomaterials for selective enzyme targeting, inhibition, and antibacterial activity. These strategies involve controlled ratios of charged ligands, tethered amino acids and peptides, Ni-nanocluster conjugation, and photo-controlled modulation of bacterial membrane interactions. Beyond therapeutic applications, these nanomaterials enable bacterial strain discrimination and antimicrobial resistance detection through a sensor array capable of monitoring genotypic and phenotypic variations. Collectively, this work highlights versatile nanomaterials with integrated theranostic antibacterial functionality, extendable to a broad range of antimicrobial biomaterials.

Wednesday, Apr 22nd 2026

16:00 Hrs (Tea / Coffee 15:45 Hrs)

Auditorium, TIFRH