

Defence Seminar

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Seminar Title	: Multi-metal resistance mechanisms in biofilm-forming bacteria and applications of biofilm associated extracellular polymeric substances in multi-metal bioremediation
Speaker	: Monika Priyadarshane ( Rollno : 5171s2005)
Supervisor	: Prof. Surajit Das
Venue	: Life Science Seminar Room
Date and Time	: 26 Apr 2024 (04:00 PM)
Abstract	: The thesis elucidates the multi-metal resistance potential, biofilm-forming ability, and enhanced heavy metal removal efficiency of bacteria isolated from metal contaminated sites. Thermodynamics of binding interactions between EPS-heavy metals was spontaneous ( $\Delta G < 0$ ), primarily driven by enthalpy change ( $ \Delta H  >  T\Delta S $ ) for both Cr(VI) and Cd(II) occurred via outer sphere complex formation, while driven by entropy change ( $ \Delta H  <  T\Delta S $ ) for Pb(II) through inner-sphere complex formation. The unchanged crystallinity ( $C_{XRD} = 0.13$ ) and no additional crystalline peaks in the metal treated EPS specified that complexation was the prevalent mechanism in metal ions sequestration. Cr 2p, Pb 4f, and Cd 3d peaks in Cr, Pb, and Cd loaded EPS confirmed the sequestration of metal ions by EPS. The uptake behavior of all the metal ions was successfully represented by the Freundlich isotherm model ( $R^2 > 0.988$ ), confirming the multilayer adsorption of tested heavy metal. The rate of adsorption of metal ions followed the second-order kinetics ( $R^2 > 0.997$ ), validating chemisorption as the predominant mechanism in adsorption of tested metal ions.