National Institute of Technology Rourkela

Registration Seminar

Seminar Title	: Exploring the role of morphogenesis of bacteria in the biofilm mode of growth for biodegradation of organic pollutants
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Venue	: Life Science Seminar Room
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Abstract : In a natural environment, bacteria frequently encounter a variety of environmental cues, including mechanical, oxidative, reductive, nitrosative, osmotic, and thermal stresses. To deal with these dynamic environments, bacteria possess different adaptation mechanisms. This includes the production of latent endospores, decrease in metabolic rate, alteration in cell shape, gene expression, and protein synthesis. The present study aimed to understand the effect of environmental cues on the phenotypic changes in the cell shape and size of *Pseudomonas putida* KT2440 and persister formation during the biofilm mode of growth. The phase contrast microscopic-based analysis of *Pseudomonas putida* KT2440 revealed that the outer layer of the colonies consists primarily of rod-shaped cells, whereas the inner layers consist of coccoid-shaped cells. The nutrient limitation revealed that the cell size decreased over time. The rod-shaped cells were predominant during the initiation phase, which converted into coccoid-shaped cells during maturation with decreasing nutrient concentration. Further, the effects of H^+ ion concentration on bacterial morphology were carried out in a pH-limiting medium with a synchronously declining order of pH from pH 7 to pH 5. The cell size of *Pseudomonas putida* KT2440 showed a significant reduction as the concentration of H+ ions increased, and the rod-shaped cells observed during the early growth phase changed into coccoid-shaped cells as the time interval increased. The current study depicted that *Pseudomonas putida* KT2440 has two vegetative phenotypes. Depending on the favourable and stressful conditions of the biofilm, the bacteria can move from motile rods to non-motile cocci and vice versa.

Keywords: Pleomorphism *Pseudomonas putida* KT2440 environmental cues nutrient limitation pH limitation