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Microbial bioremediation of hexavalent chromium

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Hexavalent chromium is known to be carcinogenic and has been identified as a potential threat to human health. Due to the increasing incidence of hexavalent Chromium (Cr-VI) contamination in soil and wastewater, different remediation strategies have been adopted to remediate the Cr (VI) from contaminated matrix. Use of microorganism for the bioremediation of Cr (VI) appears as an inexpensive environmentally friendly method of bioremediation. The microbes and algae are known to be capable of remediating Cr (VI) from soil and wastewater by bio-reduction and bio sorption. Bioremediation studies using *Bacillus sphaericus* and *Chlorella vulgaris* are presented. The adaptation of microorganisms to withstand pollutant stress has been topic great interest to environmental chemists and biotechnologists. Such adaptations include induction of cellular enzymes for bio-reduction of Cr (VI) through redox systems and by removing reactive oxygen species (ROS) via superoxide dismutase (SOD) and other free radical scavenging systems. The development of metal resistance by microorganisms adds extra advantage in bioremediation. Bio-adsorption of chromium can also occur via physicochemical interactions of metal with the metal binding polymeric substances in the membranes of microorganisms. Algal availability of numerous charged metal binding sites, capable of bio-adsorption greatly influences the removal of chromium from contaminated water. The algal membranes possess reactive functional groups such as carboxylic, hydroxyl, amino groups with ionic binding characteristics. The presentation reviews and shed light on recent studies on the mechanisms of removal of Cr (VI) by biosorption either by intracellular microbial bio-reduction and extracellular phyisico chemical chromium adsorption on the algal membrane structures.

Biography

C. R. Nair is the Director of Environmental Science Programs /Associate Professor of Chemistry and is the Project Leader of Bioremediation Research supported by the Department of Energy at Paine College, Augusta, GA. He earned his PhD in 1970 from the University of Allahabad (India) and did postdoctoral research at Vanderbilt University School of Medicine, Nashville, Tennessee (USA) and served Research Professor at LSU School of Medicine, NOLA (USA). He is licensed as High Complexity Laboratory Director (AAB). He was honored as Fellow of the American Institute of Chemists, Fellow of the national Academy of Clinical Biochemistry and Fellow of the American College of Nutrition and Fellow of the London Chemical Society. He has over 45 research publications in peer reviewed journals, held several senior positions and served in various capacities in academia and industry for the past three decades.

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