

Special Issue

Micropollutants in the Environment: Challenges and Bioremediation Strategies

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Abstract:

Remediation, rejuvenation, and recycling of resources are a natural environmental process. Albeit a bit slow activity, nature takes care of removing those environmental pollutants. On the other hand, several emerging micropollutants are posing a great threat to this natural remediation process. Some of the reasons for this dreadful status quo is increasing population, thus leading to expansive industrialization, over-exploiting the natural resources, cutting (and burning down) of forests and erosion of fertile soils, accidental-intentional release of toxic chemicals, uncontrolled agricultural practices (such as usage of pesticides) and health practices and soon. Microbial biotechnology could offer environmentally friendly approaches that can be implemented effectively for bioremediation of such micropollutants. Aspects of microbial-driven bioremediation process can benefit the community by exploiting the metabolomics capabilities of microorganisms that enable the utilization of toxic compounds and biotransformation to utilizable intermediates and end-products. Different microbes or bioproducts play a significant role in extraction and remediation of sites contaminated with heavy metals, pesticides, organic contaminants (such as dyes, hydrocarbons), different types of industrial waste in an environmentally friendly manner. While conversion of such waste products to industrially useful products (such as biofuel, and electricity generation) is also being reported as an attractive option. It is generally expected that the candidate microbe and the metabolite intended for bioremediation should be non-pathogenic, non-toxic, economically and commercially viable, active and stable under harsh environmental conditions. Recent advancements in omics and genetic engineering tools could lead the way to further achieve those selective criteria and development of tailor-made ‘microbe-metabolites’ that can be effectively applied for the environmental bioremediation in a sustainable manner. This thematic issue will highlight recent advancements in such a vast topic, through contribution from experts demonstrating different applications in day to day life, both existing and newly emerging technologies, and thought provoking approaches from different parts of the world, potential future prospects associated with some frontier development of biotechnological research related to the environment. This research topic will include contributions as reviews in following area, but not limited to:

- Micropollutants: Routes, causes, and possible treatments
- Heavy metal bioremediation and recovery by microbial products, marine microbes and biofilms
- Biopolymeric adsorbents for micropollutants removal
- Pollutants from Pharmaceutical and personal care product (PPCP)
- Microplastics as vector of contaminants –possible remediation
- Bio-utilization and bioremediation of tannery wastes, mine wastes, herbicides
- Antibiotic resistance (genes) as an emerging threat
- Oil field produced water and field waste treatment
- Industrial effluent treatment (e.g., dye industries, dairy, municipal waste water etc.)
- Enzyme technologies for remediation of emerging contaminants
- Artificial sweeteners, per-fluorinated compounds, 1,4-Dioxane, and trihalomethanes in water
- Emerging contaminants remediation (e.g. microbial fuel cell and microbial electrolysis cell).

Issue Keywords: Micropollutants; Biotechnology; Environmental pollution; Bioremediation; Industrial Waste treatment