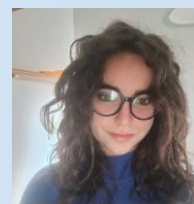


Remediation of marine sediments contaminated with recalcitrant compounds by bioslurry treatment



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Treatment of contaminated marine sediments

Concept

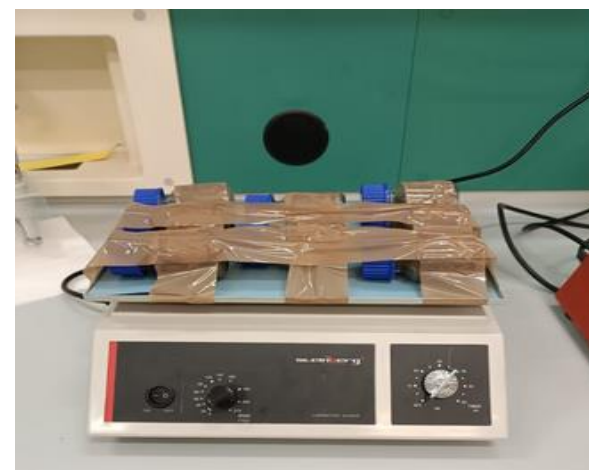
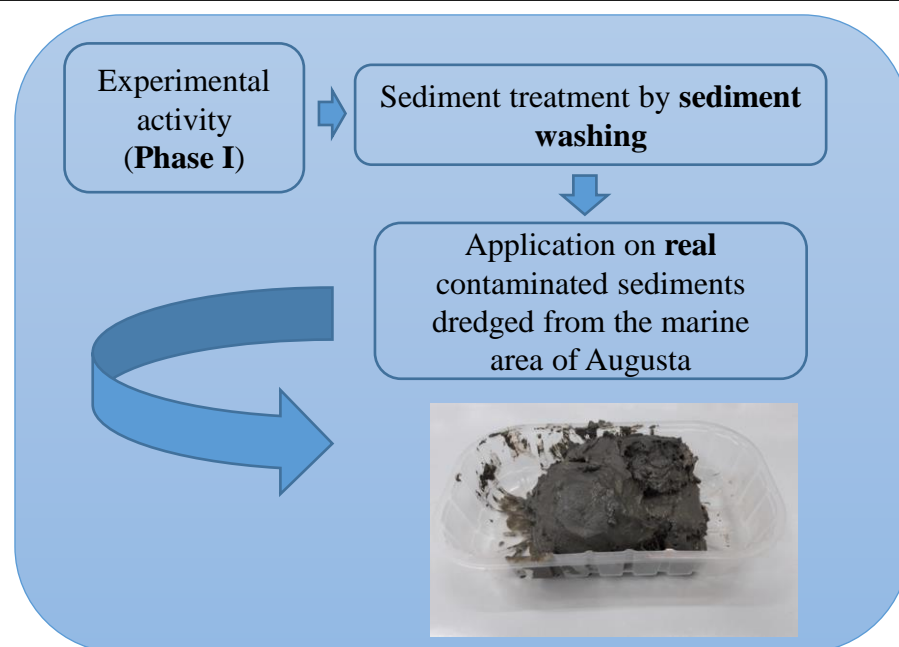
The research topic is the application of remediation technologies for the treatment of contaminated marine sediments. Coastal marine sediments represent a dynamic and essential environmental component, often subject to high anthropogenic inputs, thus representing an important receptor of contaminants and a potential reservoir for the release of toxic compounds, therefore pose a threat to human health. In particular, heavy metals and hydrocarbons pose a serious threat as they have the ability to bioaccumulate in aquatic ecosystems. In this context, port areas and many of the coastal "Sites of National Interest (SINs)" are prime examples of contaminated marine coastal areas, where heavy industrialization and the presence of commercial activities have resulted in the discharge of organic and inorganic pollutants into the water column. This has caused significant accumulation of both organic and inorganic compounds within the sediments. Nowadays, the reclamation of contaminated sediments has become a necessity.

Scientific approach (max 1000 characters)

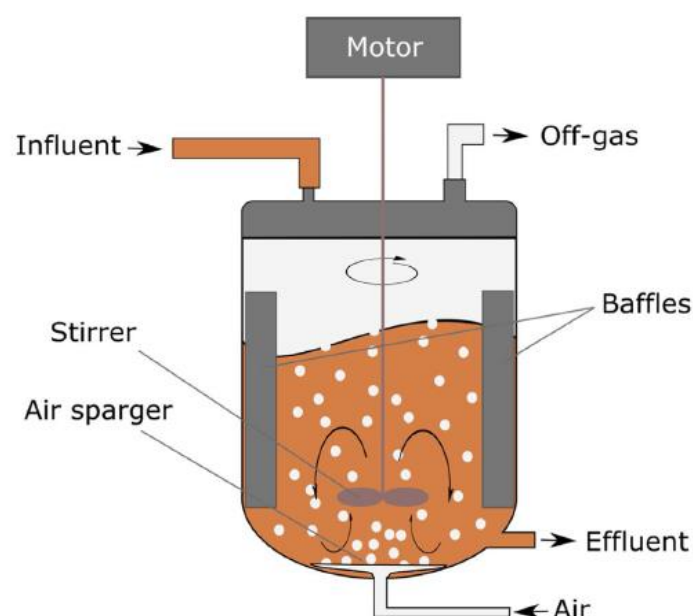
Experimental research is carried out on samples of marine sediments dredged from the Augusta Bay (Italy), a contaminated site. The planned experimental activity concerns the application of a bioslurry reactor for the decontamination of marine sediments, either through bacterial biomass or through micro fungi, in synergy with physicochemical processes. The first phase of the experimental activity is focused on the application of a sediment washing treatment, using two surfactants: Tween 80 and (Sodium dodecylbenzene sulfonate) SDBS. In particular, the influence of the concentration of the two surfactants on the effectiveness of TPH removal and the combined use of Tween 80 and SDBS is studied. The tests are conducted at different concentrations of surfactants. Each test involves contact between a sediment sample and a washing solution with different concentrations of surfactants. The glass bottles, used for the test, are mixed for using an orbital shaker. The second phase of the activity involves a bioremediation treatment through bio-slurry reactor. In particular, is studied the influence of different parameters such as: the Slurry Retention Time, the biomass inoculum and the addition of stimulating agents (biostimulation).

Research objectives (max 500 characters)

The main objective of the research project is to evaluate the applicability of biological processes for the treatment of contaminated marine sediments. In particular, the aim is to determine the effectiveness of ex situ biological treatment technologies in combination with physicochemical treatments (sediment washing), evaluating the treatment performance even under different scenarios. Biological removal performance will be evaluated in terms of macro-descriptors (removal of TPH- total petroleum hydrocarbons), but also in terms of total and volatile suspended solids concentration.



Panoramic view of the orbital shaker during experiments.



Reattore bioslurry (Pino-Herera et al., 2017).