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RESEARCH - CREATE - INNOVATE

HEAVYMOFS

Metal-Organic Frameworks as sorbents for the removal of heavy metal ions from contaminated waters

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The main objective of HEAVYMOFS is the development of new technologies for the treatment of heavy metal ion-containing wastewater, such as HgII, PbII, CdII, CrIII/VI, AsIII/V, which are common pollutants for water resources and major sources of environmental concern. The proposed technologies are based on the development of new Ion-Exchange Metal-Organic Frameworks (IEMOFs) and composites of IEMOFs with organic polymers (e.g. alginic acid, calcium alginate, etc.) which can be extremely effective at removing heavy metal ions from water, given the high sorption capacity of IEMOFs and composites for these contaminants

These studies will be carried out with both laboratory prepared standard solutions and actual waste from industrial units and/or contaminated water resources in order to determine the performance of these materials under real conditions. In the final phase of the project, the studies will be extended to the development of large-scale ion-exchange columns (containing quantities of materials in kg scale) for large volume wastewater treatment studies (m3 scale), after the pretreatment of wastewater to remove suspended solids and organic load.

The cost of the new technologies is expected to be particularly low for three reasons: (i) the relatively low cost of IEMOFs/IEMOF-composites, (ii) their ability to be reused and recycled, (iii) the low content of the columns in active ion exchange material (1-10% ww), since the extremely low-cost silica sand support matrix will constitute the main bulk (90-99% ww) of the column packing material.

Therefore, the new waste and wastewater treatment technologies to be developed in the framework of HEAVYMOFS will provide a low-cost and highly effective wastewater treatment method, with the direct outcome of protecting the environment from toxic pollutants and will, thus, make a significant contribution to the optimal use and management of water resources, which is of particular importance.

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