

Metal Organic Framework advanced adsorbents to revalorize metal ions from mining and industrial wastewater sources.

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Metal Organic Frameworks (MOFs) have emerged as high surface area chemical versatile adsorbents with high ordered crystal structures able to overcome the performance of classic adsorbent materials over organic and inorganic pollutant capture [1]. Regarding the metal ion revalorization from polluted or mining wastewater sources, several studies have revealed the MOFs capacity to capture low concentrated metal ions/radioactive isotopes from complex multi-element solutions, even in the presence of competing ions at high concentrations [2].

In this work, we are currently exploring the potential of MOF emerging technology. Indeed, selecting several micro/mesoporous MOF adsorbents, we have decorated them with natural amino-acid motifs, shifting their adsorption affinity towards metal ions with different acidity strength. Despite the promising initial results obtained in slight acidic solutions, the low chemical stability of the natural amino-acid groups at acidic conditions (pH < 4) induce their release from the porous framework, and hence, the loss of the metal-ion specificity of the designed adsorbent. To overcome this issue, a new functionalization pathway based on phosphonate and sulfonate groups is currently being applied to MOF materials, which will enable the application of these materials in highly acidic conditions, such as bio-leachates or mining/industrial acid water sources, avoiding any metal ion specificity loss during the adsorption process.

[1] Mon. *et. al.* (2018) *J. Mater. Chem. A*, **6**, 4912-4947

[2] Li *et. al.* (2018) *Chem. Soc. Rev.*, **47**, 2322-2356

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