EPFL-TTO

EPFL Innovation Park J
CH-1015 Lausanne
Switzerland
+41 21 693 70 23
http://tto.epfl.ch/

Faculty Contact

Prof. Wendy Queen
+41 21 695 82 43
wendy.queen@epfl.ch

TTO Contact

Natalia Giovannini
+41 21 693 35 90
natalia.giovannini@epfl.ch

Licensing Opportunity

TTO – Technology Transfer Office

New Composites for extraction of metal or contaminating chemical species

Ref. Nr

6.1693

Keywords

Toxic, Recyclable, Extraction, precious metals, selectivity

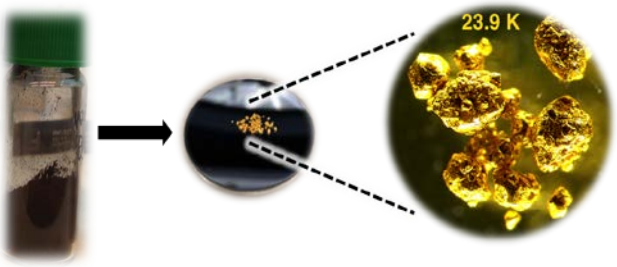
Intellectual Property

https://patentscope.wipo.int/search/en/detail.jsf?docId=WO2019038645, PCT patent application with Publication date 31.10.2019

Publication

https://pubs.acs.org/doi/abs/10.1021/acscentsci.7b00605#

Figure. A MOF composite (left)captures gold(right)from complex liquid mixtures.



Description

Industrialization has led to a rise in the generation and release of toxic chemicals like heavy metals into the environment, and hence, is a threat to water and soil quality. This a serious problem. Further, precious metals have a limited diminishing supply and are a necessity for ever increasing production of many products, such as electronics. As such, the extraction of trace amounts of heavy and precious metals from a variety of liquid streams is becoming increasingly important. Removal of these metals is a big challenge because they are often found in very complex mixtures making them difficult to extract. The present invention consists of MOF/polymer composites which can rapidly and selectively remove metals from highly complex mixtures. The MOFs are a highly porous template functionalized by at least one redox active polymer. The MOFs, made in the range of grams to 100s of grams, display removal of more than 99.8% of Hg^{2+} and Pb^{2+} ions from a 1 ppm solution of water in seconds. Further, other composites were designed that can extract trace amounts of precious metals, like gold, from solutions including industrial waste, seawater, river water, and solutions used to leach metals from electronic waste and sewage sludge.

Advantages

- Selective
- Recyclable
- Cost-effective
- Resistant to fouling

Applications

- Extraction of toxic metals like Mercury, Lead, and chromium etc.
- Retrieval of precious metals like Gold, Palladium, and Silver etc.
- The composites can also be used as a catalyst
- Reduction of Cr^{6+} ions to relatively less toxic Cr^{3+} ions