6th International Conference on

Organic & Inorganic Chemistry

August 08-09, 2019 | Amsterdam, Netherlands

Efficiency of ionic-MOFs in ion-exchange application

Ali Morsali
Tarbiat Modares University, Iran

Ionic porous metal-organic frameworks (MOFs) materials consisting of porous anionic or cationic frameworks and cationic or anionic guests are studied. The structure and performance of cationic and anionic MOFs are influenced by several factors, such as organic ligands, metal ions, and charge-balancing anions. These types of anionic and cationic materials have distinct advantages in comparison with neutral MOFs in the design of functional materials, and their synthesis affords several distinct advantages over the routine neutral frameworks by virtue of the isolated charged species in confined nano-spaces. The nanosized and charged pores in these ionic structures make a strong interaction between the host and guest molecules including enhanced adsorption towards small gases and solvent molecules. Via ion exchange, ionic-MOFs can be easily modified and accommodate other charged guest molecules, making them an ideal platform for different applications such as functional materials. Ion-exchange chromatography and ion-exchange solid phase extraction based on ion-exchange resins are known as the first generation of powerful tools for the separation of charged molecules, so the researchers are interested to find new materials with higher performance in their ability for the ions separation. Another separation method, size-exclusion chromatography, is based on the size or molecular weight of the analytes. These methods are especially useful but they are only used for separation of very large species such as proteins and polymers. But, by mixing the unique structural of MOFs, especially their porous structures with the efficiency of ion chromatography, it is possible to develop a novel separation system, in which charged MOFs replace the conventional ion-exchange resins. The structural characteristics of porous MOFs such as precisely defined pores can result in useful properties including size-exclusion effect for guest molecules in a size regime that cannot be achieved by conventional ion-exchange resins.