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FABRICATION OF SILVER DOPED TRACK-ETCHED MEMBRANES MODIFIED WITH MOF USING CLICK CHEMISTRY APPROACHES

Metal-organic frameworks (MOF) are novel 3D-type nanomaterials that can be used in gas storage, catalysis, sensing, and sorption. Modified MOFs open new opportunities for the selective sorption of contaminants from wastewater. At the same time, these 3D nanomaterials can be deposited on the surface of temples for reusable applications. PET track-etched membranes can be used as polymer templates for sensing, catalytic, and sorption applications in different research works. The deposition of MOFs on the surface and inner pores of PET TeMs allows composite sorbent to be obtained. In this study, we propose impregnating silver nanoparticles (AgNPs) on the MOFs with further deposition of these bimetallic compounds on PET TeM. To accomplish this objective, we made adjustments to the pretreated polyethylene terephthalate (PET) TeM template using polyvinylamine (PVAm) through a reversible addition-fragmentation chain transfer polymerization approach (RAFT) with the presence of 4-cyano-4-(thiobenzoylthio)pentanoic acid as a raft agent (RA). Subsequently, we proceeded with the modification using acetylene carboxylic acid to introduce alkyne bonds on the PVAm-g-PET TeM surface. Then, we established the optimal conditions for the condensation reaction between amino and alkyne functional groups. Concurrently, we synthesized azide functionalized Cr-based MOF with MIL101 type. Silver nanoparticles (AgNPs) were added to the MIL101(Cr) using a liquid phase strategy in the solution with MOFs and AgNO3 as a silver precursor. Following this, silver ions were reduced on the MOFs by NaBH4 as a reducing agent. Then the modified MOFs were immobilized on the alkyne@PET TeM template using a "click chemistry" strategy, involving a reaction between azide and alkyne groups. The resulting composite is characterized by FTIR, SEM, XRD, EDS, and pH data. The FTIR results indicated that shifts at 3249.08 cm-1 and 2119.55 cm-1 were associated with the amine and alkyne functional groups, respectively. The IR spectra of the MOF exhibited the presence of the azide group at 2122.25 cm-1. Concluding to this, we suggest the prepared composite in sorption of inorganic pollutants for water purification.

Section

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