

Bulk fabrication of porous organic framework polymers on flexible nanofibers and their application for water purification

Hangbo Yue

Guangdong University of Technology, China

Porous organic framework polymers (POP) with tailored texture and functional properties present significant advantages for a wide range of applications. However, handling/processing of POP materials that are usually obtained in powder form remains a challenge. Herein, a facile approach by means of electro-spinning and in situ polymerization is reported for the bulk creation of POP into a handleable monolithic structure. Specifically, POP polymer built from Sonogashira-Hagihara reaction of two rigid monomers, i.e. 1,3,5,7-tetrakis (1,3-bisbromophenyl) adamantane and 1,4-diethynylbenzene, are deposited on a flexible substrate of electro-spun poly(vinyl alcohol) silica PVASi fiber mat, leading to a robust POP/PVASi composite, e.g. thermally stable up to 305°C at 5% weight loss. The composite preserves the fiber's flexible network morphology, forms abundant pores on the fiber surface (specific surface area of 582 m² g⁻¹), and gains super-hydrophobic and oleophilic functionalities. Desirable applications of the composite in organic dye and oil adsorption for water purification with very high efficiency (above 98%) are demonstrated, thanks to its remarkable stability, porosity and functionality.