Facile Fabrication of Multifunctional Hybrid 3D Networks for Biological and Environmental Applications

이윤정, 이승기, 진창민, 권정아, 강태욱[1], 최인희†
서울시립대학교; [1]서강대학교

Detection of small molecules with high sensitivity and selectivity is an important task in biomedical and environmental fields. Porous structures with three-dimensionally integrated functional nanoparticles would be beneficial in achieving these goals. However such structures are usually prepared under stringent conditions and further subjected to physico-chemical attachment of nanoparticles. Here, we present a facile and eco-friendly fabrication of multifunctional hybrid networks with self-integrated nanoparticles. Water-soluble sugar crystals were used to form porous templates where liquid PDMS with nanoparticles was filled by capillary force. When the PDMS was cured, the template was dissolved in water to obtain hybrid network. Using the networks with Au or Ag nanoparticles, we detected strong Raman signals of biologically and environmentally important molecules (nucleic acids, disinfectants and VOCs) without labels. We also achieved selective removal and consecutive photocatalytic decomposition of pollutants with TiO2 hybrid networks. Our proposed hybrid 3D networks will provide useful platforms for sensitive molecular detection and efficient removal of hazardous pollutants.