Fabrication of reduced graphene oxide hydrogel for cesium adsorption

노창현[1,2,†]
[1]한국원자력연구원; [2]과학기술연합대학원대학교
(chroh@kaeri.re.kr[†])

In this study, a PB@PVP/rGO aerogel with a microporous 3D architecture and interconnected network structure was successfully synthesized using green technology based on gamma-irradiation. The aerogel exhibited an ultra-low density of 0.0273 g/cm3 with excellent swelling ability in water at low pH levels due to its highly-porous network structure. The PB@PVP/rGO aerogel maintained its integrity without structural breakage and demonstrated excellent deformability under high external pressures due to its porous 3D double-network structure and the crosslinking between the stiff GO sheets and the flexible PVP chains. The as-synthesized aerogel exhibited excellent water remediation when used as an adsorbent for Cs ions. Based on the Langmuir model, the PB@PVP/rGO aerogel had a maximum Cs adsorption capacity of 143.88 mg/g which may be attributed to the rapid diffusion of Cs ions into the porous network through capillary action, which are then electrostatically attached to the functional groups of the GO and PVP, with selective Cs ion capture by the PB nanoparticles entrapped within the rGO/PVP layers.