Sodium alginate/polyethyleneimine hydrogel: an effective material for the adsorption of heavy metal ions in water and catalysis

Abstract

Water pollution created by heavy metal ions becomes worldwide concern because of indiscriminate disposal of industrial wastewater in pure water system. In this work, we report a natural and highly efficient sodium alginate (ALG)/polyethyleneimine (PEI) composite hydrogel fabricated by a chemical crosslinking method for the removal of heavy metal ions from wastewater. The adsorption of heavy metal ions was thoroughly investigated in single ion adsorption and multi ions adsorption systems. In addition, after the adsorption we *in situ* reduced the Cu^{+2} ions forming a Cu NPs-loaded hydrogel, which proved an excellent catalyst as evidenced by the reduction reaction of 4-nitrophenol. We believe that the as-prepared ALG/PEI hydrogel will present an effective and practical paradigm for the cascaded treatment and recycling of heavy metal ions in wastewater.