

## Synthesis of polyacrylate/polyethylene glycol interpenetrating network hydrogel and its sorption of heavy-metal ions

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[Qunwei Tang](#), [Xiaoming Sun](#), [Qinghua Li](#), [Jihuai Wu](#) and [Jianming Lin](#)

The Key Laboratory for Functional Materials of Fujian Higher Education, Institute of Material Physical Chemistry, Huaqiao University, Quanzhou 362021, People's Republic of China  
E-mail: [jhwu@hqu.edu.cn](mailto:jhwu@hqu.edu.cn)

**Abstract.** A simple two-step aqueous polymerization method was introduced to synthesize a polyacrylate/polyethylene glycol (PAC/PEG) interpenetrating network (IPN) hydrogel. On the basis of the effects of the ratio of PAC to PEG, neutralization degree, heavy-metal ion concentration, and temperature on the adsorption behavior of PAC/PEG IPN hydrogel toward  $\text{Ni}^{2+}$ ,  $\text{Cr}^{3+}$  and  $\text{Cd}^{2+}$ , the preparation conditions were optimized. In our system, the greatest amount of  $\text{Ni}^{2+}$ ,  $\text{Cr}^{3+}$  and  $\text{Cd}^{2+}$  adsorbed were 102.34, 49.38 and 33.41  $\text{mg g}^{-1}$ , respectively. The adsorption abilities of a dried PAC/PEG composite and a swollen PAC/PEG IPN hydrogel were compared. It was found that the efficiency of removing metal ions using the swollen hydrogel was greater than that using the dried composite. The adsorption mechanism and model are also discussed.

**Keywords:** hydrogel, interpenetrating network, polyacrylate/polyethylene glycol, heavy-metal adsorption

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