



## The preparation of Pb(II)-imprinted polymers by the combination of surface-imprinted method with sol–gel method for the removal of Pb(II)

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### ABSTRACT

A rigid Pb(II)-imprinted polymers were synthesized by the combination of surface-imprinted method with sol–gel method using (3-mercaptopropyl) trimethoxysilane as a functional monomer, Pb(II) and hexadecyltrimethylammonium bromide as template ions and tetraethoxysilane as cross-linker and were used as adsorbents for the removal of Pb(II). The effect of molar ratio of cross-linker to functional monomer on the morphology and adsorption performance has been evaluated. The effects of pH, initial concentration and adsorption time on the adsorption performance of Pb(II) on both sorbents were investigated. The maximum adsorption capacity calculated from Langmuir isotherm was 68.03 mg g<sup>-1</sup> and 17.13 mg g<sup>-1</sup> for Pb(II)-IIP and Pb(II)-NIP, respectively. Kinetics studies showed that the adsorption process obeyed the pseudo-second-order kinetic model. The selective adsorption coefficient of Pb(II)-IIP for Pb(II)/Ni(II), Pb(II)/Cd(II), Pb(II)/Hg(II) and Pb(II)/Co(II) are 117.5, 1.42, 4.9 and 30.24, respectively. The spent Pb(II)-IIP could be reused at least five cycles, demonstrating its good practicability.

*Keywords:* Ion-imprinted polymer; Surface-imprinted method; Sol–gel method; Adsorption; Pb(II)

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