SCIENTIFIC ABSTRACT

Interaction of heavy metals with carbon and iron based nanomaterials

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ABSTRACT

The environmental pollution, especially groundwater and waste water, by heavy metals is a global issue and it is solved by many developing and also developed countries. For this reason, many scientists are focused on the creation of new materials with specific properties which would allow the adsorption of heavy and transition metals on their surface.

This study was focused on the adsorption of different heavy or transition metals (Cd(II), Pb(II), Cu(II) and As(III)) on the surface of carbon based (reduced grapheme oxide, MWCNT, expanded carbon, graphene oxide, graphite oxide, partially reduced graphene oxide) and iron based materials (γ-Fe_2O_3 nanoparticles). There were used different times of interaction (1, 5, 10, 15, 30 minutes and 1, 3, 6, 12 and 24 hours) and the adsorption efficiency was determined using difference pulse voltammetry.

Electrochemical determination proved that the adsorption efficiency of Cd(II), Cu(II) and Pb(II) was 100% from applied concentration 100 μM and 24 hours interaction in case of reduced graphene oxide and iron nanoparticles. In case of expanded carbon and MWCNT the adsorption efficiency reached the maximum value of 85%. The adsorption capacity of reduced graphene oxide and iron nanoparticles was determined as 100 μM for all used heavy metals. For As(III) the graphene oxide, graphite oxide and partially reduced graphene oxide as adsorbents were used. In case of graphene oxide the adsorption efficiency reached 35% in highly acidic pH. These results were confirmed by atomic absorption spectrometry.

Keywords: Heavy metals, carbon based materials, iron nanoparticles, electrochemistry

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