Contribution ID: **432** Type: **Poster**

Nanodiamonds as a prospective sorbent for radionuclides

Monday, 12 May 2014 17:15 (1h 30m)

Detonation nanodiamonds (DND) are potentially promising candidate for sorption applications due to their unique properties: high surface area, highly developed surface, low weight, chemical and radiation resistance. The oxygen-containing groups on the DND surface are responsible for the cation-exchange properties. The sorption capacity of DND is found to be comparable with other carbon nanomaterials as carbon nanotubes and graphene oxide and higher than that of carbon black. The sorption of radionuclides showed to be effected by surface chemistry of DND. It was shown before, that DND can effectively remove U(VI), Am(III), Th(IV), Pu(IV) cations from solutions [1].
In this work the sorption regularities of Th(IV), Ra(II), Ba(II), Ac(III) were studied for different samples of DND: commercially available nanodiamond powder (Sigma-Aldrich) and concentrated suspension, produced at the Special Construction-Technological Bureau "Technolog" of Saint-Petersburg State Institute of Technology (Technical University) (Russia). The radionuclides of interest were chosen with the aim to test nanodiamonds as a prospective sorption material for preparation of 227Ac/223Ra generator.

[1] Yu. P. Buchatskaya et al. Proc. of 42èmes Journées des Actinides and 9th School on the Physics and Chemistry of the Actinides, Bristol, England, 2012

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Session Classification: Poster Session - Separation Methods, Speciation

Track Classification: Separation Methods, Speciation