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TiO2 based absorber for uranium separation and 236U measurement with AMS

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The uranium separation from natural waters was studied at the Department of Nuclear Chemistry in late 80´s and early 90's. TiO-PAN absorber (titanium dioxide embedded in polyacrylonitrile) showed high sorption capacity for this element.
This composite absorber is planned to be used for uranium pre-concentration for measuring environmental 236U/U ratios by Accelerator Mass Spectrometry (AMS). After the preliminary AMS results showing anthropogenic contamination in TiO-PAN absorber, the preparation of titanium oxide was studied with a strong emphasis on elimination of this contamination.
Hence, titanium dioxide materials were prepared from an organic uranium-free compound. These samples were then characterized for their crystal structure, their specific surface area, and their sorption towards uranium. Detailed sorption properties were determined also for TiO-PAN absorber including kinetic experiments, sorption isotherm, and effect of several ions (Ca2+; Mg2+; Fe3+; NO3-; SO42-; Cl-; CO32-). In these experiments, the uranium concentrations were measured by Time Resolved Laser Induces Fluorescence Spectrometry (TRLFS), which allows us to measure uranium concentrations up to ppb level. A strong influence of Cl- ions present in the solutions was seen, thus the calibration of TRLFS has to be made in order to determine the correct uranium concentration.
Presently we are focusing on finding a water source which is not anthropogenically contaminated in order to use this water for further experiments and on the following separation and concentration steps for AMS sample preparation.

Primary author: Ms SPENDLIKOVA, Irena (Czech Technical University in Prague, Brehova 7, Prague 115 19, Czech Republic)

Co-authors: Dr ZAVADILOVA, Alena (Czech Technical University in Prague, Brehova 7, Prague 115 19, Czech Republic); Mr RAINDL, Jakub (Czech Technical University in Prague, Brehova 7, Prague 115 19, Czech Republic); Dr NEMEC, Mojmir (Czech Technical University in Prague, Brehova 7, Prague 115 19, Czech Republic); Dr STEIER, Peter (Vera Laboratory, Faculty of Physics, University of Vienna, Währingerstr. 17, A-1090, Vienna, Austria)

Presenter: Dr NEMEC, Mojmir (Czech Technical University in Prague, Brehova 7, Prague 115 19, Czech Republic)

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