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Development of a fast and robust sequential method for uranium and thorium decay series quantification in environmental samples

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Easily determine the radioactive behavior of a sample becomes one of the challenge of the industrialized world. Due to the enhancement of nuclear and mining activities, it is relevant to quantify the radioactivity effect of these activities and especially for nuclear disaster such as Fukushima within a short time. It currently exists a lot of method to analyse the most impact radionuclides of the uranium and thorium decay series,[1] however they are not sequenced or they are time consuming[2] and not reliable with less of 70% recovery[3]. Moreover, most currently used methods are only relevant for water samples and cannot afford to analyse all environmental matrices due to high salt concentration and heterogeneity.

In order to do so, we propose to develop an easy, fast, reliable and robust method to fractionate and analyse, in a raw material, impact radionuclides of uranium and thorium decay series which are uranium, thorium, polonium, radium and lead.

[1] Porcelli, D. & Swarzenski, P. W. The Behavior of U- and Th-series Nuclides in Groundwater. Rev. Mineral. Geochemistry 52, 317–361 (2003). [2] Lozano, J. C., Tomé, F. V., Rodriguez, P. B. & Prieto, C. A sequential method for the determination of ^{210}Pb , ^{226}Ra , and uranium and thorium radioisotopes by LSC and alpha-spectrometry. Appl. Radiat. Isot. 68, 828–831 (2010) [3] Oliveira, J. M. & Carvalho, F. P. Sequential extraction procedure for determination of uranium, thorium, radium, lead and polonium radionuclides by alpha spectrometry in environmental samples. Czechoslov. J. Phys. 56, 545–555 (2006).

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