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Application of AMS for the analysis of primordial nuclides in high purity copper.

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The sensitivity of experiments in rare event physics like for example dark matter detection crucially depends on the background level. Therefore, all material surrounding the detectors requires low contamination of radionuclides in order not to create additional background. A significant contribution originates from the primordial actinides thorium and uranium and the progenies of their decay chains. At the Maier Leibnitz Laboratorium in Munich the applicability of ultrasensitive Accelerator Mass Spectrometry (AMS) for the direct detection of thorium and uranium impurities in a copper matrix was tested for the first time. For this special purpose, Th and U were extracted from the ion source as a copper compound. Different samples of copper, high purity copper and of a copper alloy were investigated. The lowest concentrations achieved in AMS measurements so far were (1.4+-0.6) x 10-11 g/g for thorium and (7+-4) x 10-14 g/g for uranium which correspond to (56+-16)µBq/kg and (0.9+-0.5)µBq/kg, respectively. The particular requirements on the AMS technique and the developed procedure will be presented.

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