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Development of an in-situ radiotracer method to measure the adsorption phenomena of different alpha-emitters

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The so called in-situ radiotracer methods are widely used for the determination of charge- and mass transport on the liquid-solid interfaces. With these methods different phenomena can be investigated, such as adsorption, corrosion, contamination or decontamination. Each technique is based on the thin layer principle of Aniansson, which claims, that the adsorbed amount of a radioactive isotope with soft radiation can be measured with low background noise in case of proper cell arrangement.

In the past decades several methods were developed to measure the adsorption phenomena of different beta and soft gamma emitting isotopes in-situ (^{36}Cl , ^{35}S , ^{32}P , ^{51}Cr , ^{110}mAg , etc.), but none for the alpha emitters. The alpha radiation measurement technique is extensive, several measurement methods have been developed to measure both intensity and spectroscopic parameters. However, the existing methods are not capable to measure under in-situ conditions, most of them are presume vacuum technique, in which case a continuous contact with the solution is not possible.

To determine the adsorption of alpha emitters under in-situ conditions on compact surfaces development of a new technique is necessary, which is the aim of this work.

The main steps of the research and development project are:

- Selection of the proper detection technique
- Design a cell construction, which fits the Aniansson principle
- Preparation of a high activity pure alpha source
- Calibration of the cell
- Determine the main equations
- Measure the adsorption phenomena of different alpha emitting isotopes

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