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Imaging the plant uptake of radionuclides on the single-cell scale using resonant laser ionization mass spectrometry

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In radioecological studies, the plant uptake and distribution of radionuclides are of major interest for risk assessment. In the present work, the elemental distribution within the tissue of plants is imaged by resonant laser secondary neutral mass spectrometry (rL-SNMS). This technique combines a commercially available time-of-flight secondary ion mass spectrometry (IONTOF TOF.SIMS 5) with a laser system for ionization of sputtered neutrals. Due to the excellent suppression of molecular isobaric interferences by rL-SNMS, about 10^{10} atoms of technetium suffice to image the Tc-99 distribution inside plant cells with a spatial resolution of approximately 300 nm. The distribution of technetium in the two plant species *Daucus carota* and *Pisum sativum* was determined. For reasons of radiation protection, the plants were labelled with Tc-99 at a concentration of 0.1 mM. Such a low concentration renders measurements by conventional SIMS impossible. [1]

[1] DOI: 10.1016/j.jhazmat.2021.127143

Workshop Themes

Sample analysis and standards

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