Determination of heavy metal element in USGS SRMs and tree-ring by LA-ICPMS

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In order to evaluate the precision and accuracy using LA-ICPMS, thirty major and trace elements were analyzed with 3 USGS SRMs. And we investigated correlation between metal concentrations in five species tree-ring and ambient air heavy metal pollution history in ambient air. Total thirty major and trace elements in three USGS basalt glass reference materials, BIR-1G, BCR-2G and BHVO-2G were determined using LA-ICP/MS. Calibration was performed using NIST glass SRM 610, 612 and 614 in conjunction with internal standardisation using Ca. Relative standard deviation(RSD) of determinations was below 10% for most elements in all glasses under investigation. All the USGS SRMs showed negative correlations between RSD and concentrations for elements with logarithmic correlation coefficients ranging from –0.867 to -0.790. Furthermore, these values were similar results obtained in NIST glass SRM 610, 612, 614. In natural sample analysis, 7 heavy metals in 5 tree species(Platanus occidentalis, Salix koreensis, Chamaecyparis obtusa, Pinus densiflora, Ginkgo biloba) were determined using LA-ICP/MS, and calibration was performed using cellulose - matrix matched standards with 13C nomalization. Four tree ring series showed that the Pb and Fe accumulation rates were higher between ‘92~’99 except for Ginkgo sp., but other elements(Cr, Mn, Cd, Zn, Sr) varied depending on species, which was caused by the physiological process of element uptake and radial mobility. Pb and Cd concentrations in tree ring of Pinus sp. have correlated with the ambient air heavy metal monitoring data which showed the correlation coefficients of 0.879 and 0.579, respectively. Pb and Cd concentrations in tree-ring of Salix sp. and Platanus sp. showed positive correlation with coefficients of 0.671 and 0.825, respectively. Therefore, our results suggested that Pb and Cd concentrations of Pinus sp. can be interpreted in terms of ambient air heavy metal pollution history.