# Multi-element analysis of PIXE for lichen samples from Shirakami-Sanchi, Akita
# -Utilities of lichens as bioindicators of environmental monitoring-

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## Abstract

Utilities of lichens as bioindicators of environmental monitoring were examined by PIXE analysis. Several lichens sampled from Shirakami-Sanchi, Akita. They were dried by air and milled by an agate mortar. Powdered lichens were sifted and suspended into water containing Triton X-100 as a surface-active agent and polyinylalcohol as a binder agent. The suspensions were filtered on Nuclepore Track-Etch Membrane (pore size : 10 $\mu$m) and the membrane targets were bombarded by 3 MeV Proton from NMCC cyclotron. 5 Kinds of lichen were analyzed by PIXE and concentration for 26 elements were determined by PIXE analysis. Determined elements were major, minor and trace elements in biological materials and contained several essential elements such as Fe, Zn and Cu. And also this PIXE analysis could measure some toxic elements, Hg and Pb. Relative standard deviation for each lichen sample from 3 analytical targets were 1-13% for traces of Hg and Pb. It was shown that the uniformity of the target was excellent. The sample preparation for lichens is simple and this PIXE analysis is able to measure so handily multi-elements, that it is useful for the environmental evaluation by lichens.