# Low background In-situ $^{10}$Be AMS analysis using improved Be extraction method

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Surface exposure dating, which calculates the exposure age of rocks based on the accumulation of cosmogenic nuclides generated in rocks on the ground surface, is a very useful technique for directly dating the age of rocks exposed on the ground surface. There are several types of cosmogenic nuclides used in surface exposure dating. For example, $^{10}$Be, $^{26}$Al, $^{36}$Cl, $^{14}$C . In particular, surface exposure dating using $^{10}$Be, which is mainly generated by the spallation reaction of oxygen atoms of quartz particles in rocks, has a simple generation path and a short half-life of $^{10}$Be of about 1.5 million years. $^{10}$Be is useful nuclide because it is suitable for reconstruction of the Quaternary environmental changes.

Surface exposure dating has many advantages, but its analysis is not easy. This is mainly due to the extremely low abundance of cosmogenic nuclides. The amount of cosmogenic nuclides generated on the ground surface is proportional to the cosmic ray flux that reaches the ground surface. Since cosmic rays are shielded by the atmosphere and the earth's magnetic field, the generation rate of cosmogenic nuclides is low in low and middle latitudes where the shielding effect of the earth's magnetic field is high and in areas where the shielding effect of the atmosphere is low. Threfore, this method is widely applied to polar regions such as Antarctica where the generation rate is high, and to high altitudes in the middle and low degree regions. However, this method has the advantage of being able to directly measure the age at which rocks were exposed on the ground surface, and is also required to be applied to low-middle latitude areas and low elevation areas near coastlines.

The concentration of $^{10}$Be generated in rock is very small. Accelerator mass spectrometry (AMS) is used to measure such a very small amount nuclides. Accelerator mass spectrometry discriminates isobars $^{10}$B and $^{10}$Be, but it is necessary to minimize the concentration of $^{10}$B in the sample to perform ultra-low concentration $^{10}$Be analysis.

Ion chromatography using a cation exchange resin has been used for extraction of Be from rock samples for accelerator mass spectrometry. However, in this method, the extraction position of the target Be is shifted due to the content of impurity ions contained in the sample, or the impurity ions remaining after the ion exchange column experiment adversely affect the subsequent Be purification.

Therefore, in this study, it was possible to obtain high-purity Be by adding the chelating resin solid phase extraction method using DIPEX (R) extractant to the separation and purification process of Be. By adding this extraction process, the residual amount of B in the pretreatment process was reduced by more than 90%, and the analysis of ultra-low concentration $^{10}$Be became possible. This is expected to make it easier to apply surface exposure dating to low altitude areas in low and middle latitudes such as Japan. In this presentation, we introduce its application examples.

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