

## Provenance Studies for Prehistoric Obsidian by Using Mössbauer Spectroscopy

Young Rang UHM\* and Gwang-Min SUN

*Neutron & Radioisotope Research Division, Korea Atomic Energy Research Institute (KAERI), Daejeon 34057, Korea*

Mi-Eun JIN and Yong-Joo JWA<sup>†</sup>

*Department of Geology and Research Institute of Natural Sciences,  
Gyeongsang National University, Jinju 52828, Korea*

Jae Yeon SEO, Hyunkyung CHOI and Chul Sung KIM

*Department of Nano-electro Physics, Kookmin University, Seoul 02707, Korea*

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The iron compounds in minerals of obsidians from the continental Far East, Mount Baekdu (Baedusan) near the Sino-Korean border and Kyushu in southwest Japan were studied using  $^{57}\text{Fe}$  Mössbauer spectroscopy. The mineral Pyroxene ( $\text{FeSiO}_3$ ) in obsidian was found in the metamorphic rocks of Mount Baekdusan and Kyushu. However, the mineral biotite in obsidian was found in Kyushu only. The chemical compounds of the microlites in obsidians from Mount Baekdu are quite different from those in the Kyushu obsidians. The Mössbauer spectrum measured on the Baekdusan obsidian was fitted using two sextets, two ferrous iron doublets, and a ferric iron doublet tentatively assigned to clinopyroxene. Two sextets result from the nonstoichiometric magnetite. In contrast, Kyushu obsidians consisted of two sextets, a ferrous iron doublet for clinopyroxene, and a ferric iron doublet tentatively associated with biotite. In mineralogical and geochemical studies on the Baekdusan and Kyushu obsidians, the origination of the magma compositions and the crystallization environments were confirmed to have been different.

Keywords: Mössbauer spectroscopy, Obsidian, Pyroxene ( $\text{FeSiO}_3$ ), Biotite  
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