

Color change of a scoria and simulation heating experiments by spectro-colorimetry

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Introduction

Colors of volcanic deposits were recently described quantitatively and discussed in relation to eruption styles (Moriizumi and Nakashima, 2000). In order to investigate color changes of volcanic deposits associated with eruption processes, a scoria deposit at Takatsukayama, Higashi-Izu monogenetic volcanic group, Japan was studied both in the field and by laboratory simulation experiments.

Color measurements of a natural scoria cone

A lateral color variation from black to red is observed at a wide outcrop of the inner scoria cone at Takatsukayama. A previous study (Koyama et al., 1995) described qualitatively scoria color and explained that color change was caused by high temperature oxidation.

In this study, colors of scoria were first measured on site laterally and powdered samples were also measured by spectro-colorimetry (Minolta CM2002). The obtained data were presented in the CIE Lab color space by using L*(brightness), a*(green-red) and b*(blue-yellow) values.

The scoria cone showed increase in a* and b* values (i.e. color change from black to red) in about 200 m. Since the color changes laterally cross-cutting the scoria layers, the red coloring is considered to have occurred after scoria deposition.

Heating experiments of scoria

We conducted simulation experiments for this red coloring of scoria by heating black scoria powders in a Muffle furnace at temperatures from 500 to 1150 °C for 10 minutes to 24 hours. The scoria powders became reddish for all the experiments, with increase in a* and b*. The b*/a* ratios were dependent on the heating temperatures and they were found to be smaller for higher temperatures. Therefore, the b*/a* ratios of natural scoria can be used to evaluate the temperature gradient of the scoria cone.

The spectro-colorimetry was thus proven useful to study volcanic eruption processes.

References

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Moriizumi M. and Nakashima S. (2000), *Earth Monthly*, **22**, 435-439.

Mn-Cr isotope systematics of mesosiderite Vaca Muerta

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Introduction

The origin of silicate clasts in mesosiderites and their possible relation with the HED parent body has been a topic of debate. Recently, Wadhwa et al. (1997, 1999) investigated the Mn-Cr isotope systematics of silicate clasts from the mesosiderite Vaca Muerta to shed light on this issue. Here we report our recent results on the Mn-Cr isotope systematics of silicate matrix of Vaca Muerta to further look into this issue.

Analytical methods

Our analytical method for Cr isotope is similar to that of Lugmair and Shukolyukov (1998), except Si-Al-boric acid mixture was used as an activator. All measurements were done using Finnigan MAT 262 TIMS. The Mn/Cr ratios were measured using ICP-AES (~5% uncertainty).

Results and discussion

As shown in Fig. 1, the Cr isotopic compositions of the three mineral fractions separated for this study range from 0.52 to 0.59 epsilon unit. These values are broadly similar to that of the silicate clast VM4659 (Wadhwa et al. 1999), which may hint towards some genetic relation between the clast and the matrix studied here. However, the heterogeneous nature of this sample makes it difficult to obtain a representative Mn/Cr ratio of the bulk matrix so a direct comparison between the matrix and the HED bulk isochron cannot be made at this stage. This has to be further evaluated using a larger sample.

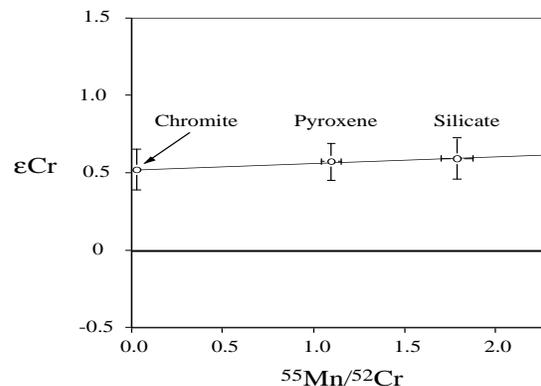


Figure 1 Mn-Cr systematics of the silicate matrix of mesosiderite Vaca Muerta.

References

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