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RESEARCH FRONTIERS
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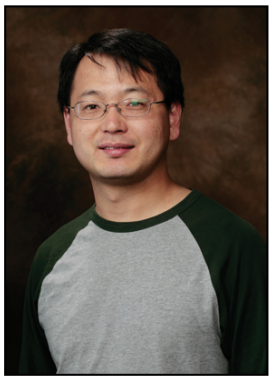
Lava Lakes and Planetary Origins

March, 2009

A researcher and his colleagues have found differences in the iron isotope composition of basalts from a lava lake in Hawaii that point to new ways of studying the origins of the earth and other planets.



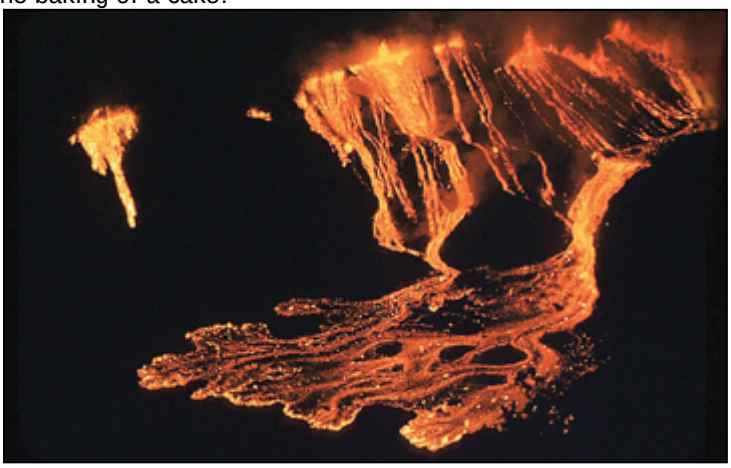
Fang-Zhen Teng, assistant professor of geosciences and a member of the Arkansas Center for Space and Planetary Sciences, and colleagues at the University of Chicago, and the U.S. Geological Survey report their findings in *Science*.

The researchers examined iron isotopes in basalt samples from the Kilauea Iki lava lake on the main island of Hawaii. Isotopes have the same chemical properties but different weights, so some processes cause what looks like the same material to behave differently - often separating the two. Such separation can tell scientists about how the material containing the isotopes formed.

Until now scientists thought that isotope fractionation occurred at low temperatures and with elements of low molecular weight. Because of the heat and iron's molecular weight, scientists thought that the process that formed basalts did not separate iron isotopes.

Teng likens the change in iron isotopic composition in basalts to the baking of a cake:

With a cake, you start out with certain ingredients, but the baking process changes the ingredients and their proportions within the cake. In the same way, the process that makes basalt magma through partial melting of the mantle rocks changes the iron isotope compositions.



Past studies examined basalts, but did not study the individual minerals found within a basaltic rock.

"We analyzed not only the whole rocks, but the separate minerals," Teng said. The minerals examined showed iron isotope separation.

If basalts from planets have similar iron isotope separation, it suggests that they formed through heat processes similar to those on Earth.

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