Japan Geoscience Union Meeting 2015
(May 24th - 28th at Makuhari, Chiba, Japan)

MTT44-07 Room:102B Time:May 26 17:15-17:30

We are always on the frontier!

YURIMOTO, Hisayoshi[1*]

[1]Hokkaido University

Oxygen isotope anomaly in the solar system was found from a meteorite by Clayton et al. (1973). The origin is still unknown and it is principally unsolved although we can infer it precisely. More interesting puzzle for the oxygen isotope anomaly than the origin may be the anomalous distribution among minerals and within a mineral in a Ca-Al-rich inclusion (CAI). CAIs are the oldest rock in the solar system, and are largely mm to cm in size. The CAIs formed in the solar nebula by crystallization from liquid droplet or from surrounding hot gas. However, nobody has been succeeded to describe how to establish heterogeneous oxygen isotope anomaly in a CAI according to known chemical reactions so far because the oxygen isotopic distribution is apparently inconsistent with phase relation and crystal growth in the chemical system of CAIs. This is mysterious because the chemical system of CAIs seems to be much simple comparing with terrestrial rocks. In this talk, I show an attempt to clarify this mystery predicts that oxygen isotope anomaly distributes globally but changes the degree systematically on all solar system objects including outer planets. The global change of oxygen isotope anomaly in the solar system should involve isotope anomalies of hydrogen and nitrogen. The attempt also predicts that isotope anomalies of these three elements are universally observed in exoplanetary systems, which degrees may be an indicator for habitability. These predictions can be proved by development of planetary explorations and astronomical observations, which are parts of cosmochemistry, even if the origin of the oxygen isotope anomaly in the solar system is principally an unsolved issue.

References:
Yurimoto, H. (2014) That’s One Thing, This Is Something Else! Kakenhi NEWS 2014, vol. 2, 7.
http://www.jsps.go.jp/j-grantsinaid/29_essay/no63.html
http://www.jsps.go.jp/english/e-grants/kakenhi_essay/grants11_63.html

Yurimoto, H. (2009) Anatomy of Protosolar System. JGL 5 (3), 8-9.
http://www2.jpgu.org/publication/jgl/JGL-Vol5-3.pdf

Yurimoto, H. (2006) Preface. Yuseijin 15, 43.
https://www.wakusei.jp/book/pp/2006/2006-2-01/2006-2-01.pdf

Keywords: Geochemistry, Frontiers