Solar wind hydrogen and helium in NASA *Genesis* collectors

H. YURIMOTO[1], N. SAKAMOTO[1], K. BAJO[1], A. J. G. JUREWICZ[2], D. S. BURNET[3]

[1]Hokkaido University, yuri@ep.sci.hokudai.ac.jp
[2]Arizona State University, Amy.Jurewicz@asu.edu
[3]California Institute of Technology, burnett@gps.caltech.edu

The highest energies of solar wind (SW) H and He give insight into the solar phenomenon known as a coronal mass ejection (CME). These high energies can be measured in Genesis samples, as the implantation profiles of SW particles in a solid material directly irradiated by the SW echo that energy distribution. We previously measured a SW He implantation profile from a bulk solar wind collector from the NASA *Genesis* SW sample return mission [1, 2] and discussed energy distribution of SW components for the low-speed, high-speed and CME He.

Hydrogen is the most abundant element in the SW and analyses producing depth profile analysis of SW H have been used successfully to determine the H fluence [3, 4]; however, fluence analyses do not require a wide dynamic range, so their analysis of the energy distribution of SW H is limited. Here we report depth profiles of SW H from bulk solar wind and CME collectors of *Genesis* that have a wide dynamic range. We also discuss H/He ratio variations as a function of SW kinetic energy.

Genesis collector chips of diamond-like carbon film on silicon wafers from the B/C bulk solar wind array and from the CME E array. The *Genesis* collector chips were measured by SIMS and SNMS in depth-profiling mode using Cameca ims 1270 and JEOL LIMAS at Hokkaido University.

The depth profiles in both arrays have different peak H concentrations but similar peak depths: 6.0×10^{21} cm^{-3} at 12 nm in depth for B/C array, 1.5×10^{21} cm^{-3} at 14 nm for E array. The peak depths indicate that both arrays collected SW H at an dominant energy of ~1 keV. The H concentration drops to ~10^{19} cm^{-3} at 100 nm; after that the rate of decrease slows to show high-energy SW H tails. The tail profiles are essentially the same between both profiles, suggesting CME H of the Halloween solar storm of 2003. The tails show that SW speed of the Halloween storm reached to 3000 km s^{-1}. Similar tailing has been observed from the He depth profile of *Genesis* [2]. The He/H ratios are 2–3 times higher in the CME flow than in the normal SW flow.

[1] Bajo K. et al. (2015) *Geochem. J.* 49, 559–566. [2] Yurimoto H. et al. (2017) *Meteoritics & Planet. Sci.,* 52, S1, Abstract #6228. [3] Koeman-Shields E. C. et al. (2016) *LPS XLVII,* Abstract #2800. [4] Koeman-Shields E. C. et al. (2017) *Meteoritics & Planet. Sci.,* 52, S1, Abstract #6142.