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Analysis of oxygen in a Genesis concentrator sample.

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The determination of the oxygen isotopic composition of the Sun is the highest priority scientific goal of the Genesis Mission as such data would provide a baseline from which one could interpret the oxygen isotopic differences amongst planetary materials. We have designed and constructed MegaSIMS [1], a hybrid secondary ion and accelerator mass spectrometer (SIMS/AMS), to measure the solar oxygen and nitrogen isotopic compositions from the Solar Wind (SW) captured by an electrostatic concentrator [2] into SiC target wafers. Here we report the first analyses of the concentrator SiC sample #60001. The sample was ultrasonically cleaned in xylene and inspected optically to confirm that areas free of particles larger than 1μm exist in between other damaged and/or contaminated areas. The sample was left in the sample chamber for 5 days during which time the chamber was baked at 125 ºC for 46 hours. Prior to analysis, the immersion lens extraction plate was cleaned by intensive sputtering of oxygen-free SiC for 4 hours. For this initial measurement, we picked a location close to a defect in the SiC, so as not to consume area that would be valuable for other analyses (r = 20mm, θ = 45º). A 5 keV impact Cs^+ cleaning beam was run for 5 minutes at 20 nA to re-move $\sim$20 nm of the surface. The analysis was carried out with a 30 nA Cs^+ beam rastered over 130 μm. The field aperture gated the analytical area to 100 μm diameter. A second analysis was carried out in the same area, adjacent to the SiC defect, without low energy Cs^+ cleaning, in order to establish an absolute depth scale. The $^{16}O^{++}$ signal from the SW is well separated from terrestrial background from surface contamination and the instrument and is implanted to a mean depth of $\sim$

80 nm. Preliminary isotope abundance data will be reported at the meeting.

References: [1] P.H. Mao et al. (2006) 37th Lunar and Planetary Science Conference, Abstract #2153. [2] J.E. Nordholt et al. (2003) Sp. Sci. Rev. 105, 561-599.