PRELIMINARY QUANTIFICATION OF IMAGE COLOR GRADIENT ON GENESIS CONCENTRATOR SILICON CARBIDE TARGET 60001.

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Introduction: The Genesis spacecraft concentrator was a device to focus solar wind ions onto a 6-cm diameter target area, thus concentrating the solar wind by 20X [1]. The target area was comprised of 4 quadrants held in place by a gold-coated stainless steel "cross" (Fig. 1). To date, two SiC and one chemical vapor deposited (CVD) quadrants have been imaged at 5X using a Leica DM-6000M in autoscan mode. Complete imaging of SiC sample 60001 required 1036 images. The mosaic of images is shown in Fig. 2 and position of analyzed areas in Fig. 3. This mosaic imaging is part of the curatorial documentation of surface condition and mapping of contamination. Higher magnification (50X) images of selected areas of the target and individual contaminant particles are compiled into reports which may be requested from the Genesis Curator [2].

Measures of changes radially across targets: Careful measurements of nobles gases along the the length of the gold-coated stainless cross arms have been used to calibrate the focusing of the concentrator [3]. The gold cross arms have been designated with clocking numbers (Fig. 1). Ellipsometry has shown variation, with radial distance, in detectable radiation damage of SiC substrate [4]. This study investigates the quantification of the color variation with radial distance, observed on the SiC targets. Nature of the color variation is not addressed, but is assumed to be related to concentrator focusing. Fig. 2 has been color enhanced to illustrate the color gradient, the shadow effects along the cross arms, and the non-uniform illumination of individual mosaic frames.

Methodology: In reflected light, 1044 x 772 pixel bitmap images were acquired using Surveyor software interfacing with ImageProPlus software on the Leica DM600M microscope. Each frame in the mosaic was illuminated the same, even though the illumination was not uniform across the frame. Therefore, a central section of each frame, consisting of 46656 pixels, was used to determine the mean red and mean blue pixel intensities in RGB mode with Canvas X With Scientific Imaging. Data was taken from original, unprocessed images. Red pixel intensity to Blue pixel intensity ratios were calculated for 3 radial cross-sections and areas shadowed by the cross frame (Fig. 3). Fig. 4 yields a smooth curve for the mid radius track and shows error bars typical of all data taken. Contaminant particles in the field of view increase the deviation.

Results:. Fig. 5 shows that all 3 radial cross-sections are tightly grouped, giving confidence to azimuthal uniformity. The important note for users of this sample, is the data point, not in shadow, of lower Red/Blue intensity, next to the central cross. This implies a lessening of implantation effects, perhaps due to scattering, and suggests avoiding these regions for analysis.

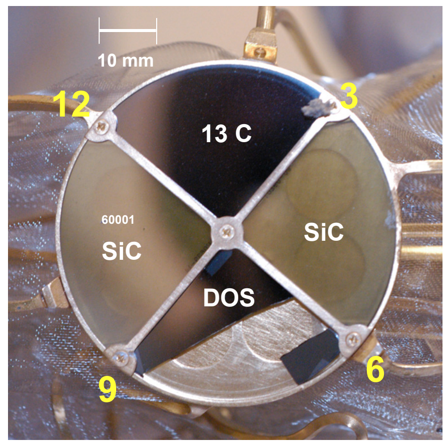

Fig. 1. Concentrator targets held in mount by cross-shaped frame. Sample 60001 is left, between 12 and 9 o'clock arms.

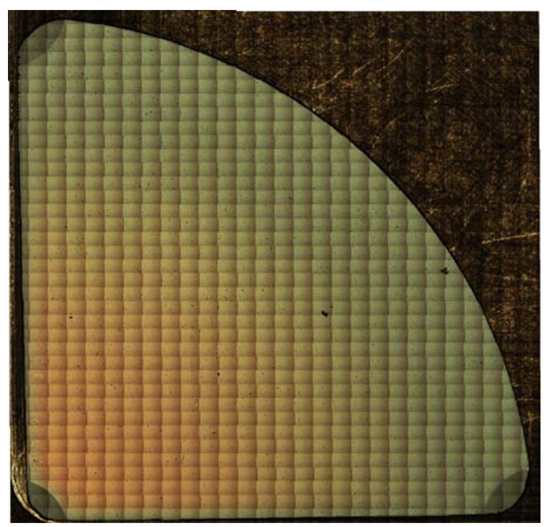

Fig. 2. Mosaic of 1036 images. This mosaic has been color enhanced to illustrate gradient, edge effects and individual frame variation. 9 o'clock arm is vertical, 12 arm is horizontal.

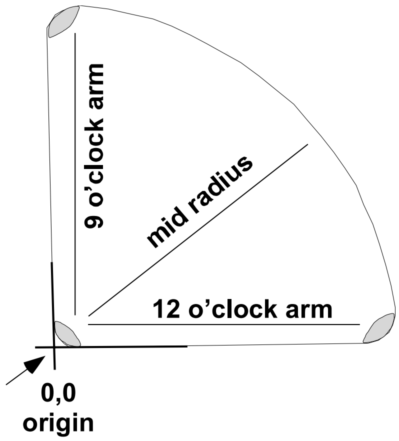

Fig. 3 Drawing showing track of color gradient data plotted in Figs. 4 & 5. Gray areas in corners are shadows from cross-shaped holder.

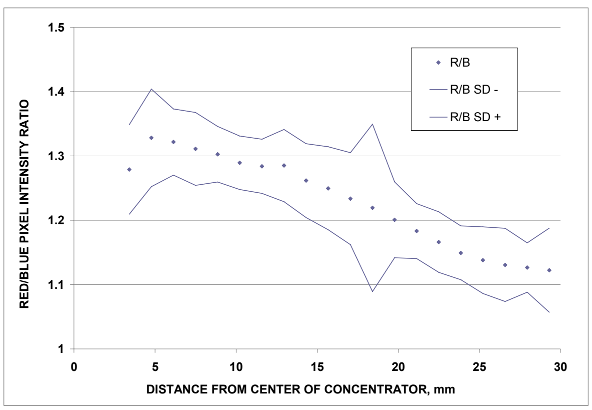

Fig. 4. Red/Blue ratio plot of mid radius track with error bars typical of plotted data.

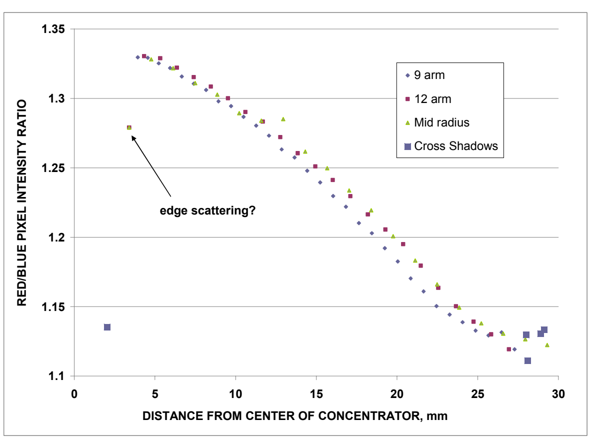

Fig. 5. Red/Blue intensity variation as function of radial distance for the 9 o'clock arm track, 12 o'clock track and mid radial track.

References: [1] Nordholt J. E. *et al* (2003) *Space Sci. Rev*., **105**, 561-599. [2] Calaway M. J. *et al*, (2008) *LPS XXXVIV*, this volume. [3] Heber V. S. *et a*l (2007) *Space Sci. Rev*, **130**, 309-316. [4] Calaway, M.J., et al. (2007) *LPS XXXVIII*, Abstract # 1632;