SIMS ANALYSIS OF MICROMETEOROID IMPACTS ON LDEF; S. Amari, J. Foote, E. K. Jessberger, C. Simon, F. Stadermann, P. Swan, R. M. Walker and E. Zinner,

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LDEF experiment AO187-2 consisted of 237 capture cells, 120 on the leading edge, the rest on the trailing edge. In each cell a 2 μm plastic foil, metallized on both sides, covered polished Ge targets. Although all plastic covers except for 12 cells on the trailing edge failed during flight, the Ge plates contain many extended impact features that were apparently produced by projectile material that had penetrated the plastic foils while they were still intact. We optically scanned all cells without plastic foil from the trailing edge and found extended impact features from 200 to 4000 μm in diameter with 4 characteristic morphologies: a. craters surrounded by deposits, b. ring-shaped features, c. sprays, and d. "spider webs." 53 impacts were selected as high priority candidates for ion probe analysis. After detailed documentation in the SEM impacts were analyzed in the ion microprobe for the chemical composition of the remaining projectile material. Prior simulation studies [1] had shown that extended impact on the Ge plates contained sufficient projectile material for chemical and isotopic analysis by SIMS. We made multi-element point analyses in lateral scans across the impact features. Each point analysis consisted of depth profiles of a number of elements. In all of 12 impacts so far studied we found evidence for the presence of projectile material in the form of elemental enhancements in the impact region, in 5 cases significant amounts of projectile material were detected. One such analysis is shown in Figs. 1 and 2. Fig. 1 shows ion signals of different isotopes normalized to the 76Ge signal for a scan across a "spider web" impact. In Fig. 2 the selected signals of 27Al, 28Si, 40Ca, 48Ti and 56Fe were normalized with relative sensitivity factors determined from laboratory studies [1] to obtain elemental abundance ratios relative to Mg. Their abundances indicate an extraterrestrial origin except for Si, which is anomalously high and is probably dominated by contamination from RTV glue used to bond the Ge plates to the Al substrate. Enough material is present to allow isotopic measurements, which will be reported at the meeting.