On the Structure of Acfer094-07 Matrix Grains and the Origins of Cosmic Symplectites

Isabella Solaro
Washington University in St. Louis

Follow this and additional works at: https://openscholarship.wustl.edu/wuurd_vol13

Recommended Citation
https://openscholarship.wustl.edu/wuurd_vol13/192
On the Structure of Acfer094-07 Matrix Grains and the Origins of Cosmic Symplectites

Isabella Solaro

Mentor: Ryan Ogliore

Though many studies focus on the intricate chondrules of chondrite, here we study the origin of the enigmatic fine-grained matrix of primitive meteorite in order to determine if it is a pristine sample of interstellar space or formed by processes on the parent asteroid. In this study, we first gathered elemental compositions and high-resolution backscattered electron maps of 25 matrix regions of the carbonaceous chondrite Afer094-7 and used these chemical maps to investigate both the origin of the aqueous imprints on matrix and to detect extremely oxygen-rich symplectites that have been present in other thin sections but never studied in No. 7. Though the initial goal was to analyze the structure of the matrix, the grains were too fine for Electron Backscatter Diffraction (EBSD), so the detection of cosmic symplectites was a viable second option. We first use optical microscopy to detail which large regions did not host chondrites and then located 20x20 micron regions with the finest grains and no inclusions using the Scanning Electron Microscope to collect the backscattered electron images. From these scans, we were able to determine the atomic percent of each element using energy-dispersive X-ray spectroscopy. The atomic percent, normalized to silicon, could be found for each pixel on the scan. Further, ion probe and Auger data were collected for six select regions whose compositions could best be described as chondritic. This study finds that there is a possibility for symplectite inclusions in the matrix based on the compositional data collected and the ion probe data trending toward symplectite levels. Though the study is ongoing, there are clear steps forward; pixel-by-pixel or grain-by-grain analysis can be used to find grains rich in 17O and then can be compared to known isotopic values of symplectites.