

Washington University in St. Louis

## Washington University Open Scholarship

---

Volume 13

Washington University  
Undergraduate Research Digest

---

Spring 2018

### 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](https://openscholarship.wustl.edu/wuurd_vol13)

---

#### Recommended Citation

Solaro, Isabella, "On the Structure of Acfer094-07 Matrix Grains and the Origins of Cosmic Symplectites" (2018). *Volume 13*. 192.

[https://openscholarship.wustl.edu/wuurd\\_vol13/192](https://openscholarship.wustl.edu/wuurd_vol13/192)

This Abstracts S-Z is brought to you for free and open access by the Washington University Undergraduate Research Digest at Washington University Open Scholarship. It has been accepted for inclusion in Volume 13 by an authorized administrator of Washington University Open Scholarship. For more information, please contact [digital@wumail.wustl.edu](mailto:digital@wumail.wustl.edu).

# 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  $^{17}\text{O}$  and then can be compared to known isotopic values of symplectites.