CT, SEM, and LA_ICP_MS Map Investigation of Chondrule Rims in CM2

Aguas Zarcas

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ABSTRACT

This study investigates chondrule fine-grained rim (FGR) formation and its relationship to the matrix in CM2 Aguas Zarcas (AZ) by combining SEM, XCT, and LA-ICP-MS analyses. High-resolution spatial data allow a novel investigation into early solar system processes and provide insights into chondrule formation mechanisms and elemental distributions. Shape and volume analyses of chondrule cores and rims were performed using XCT. Major and trace element distributions of rims and matrix were analyzed in SEM and by assigning ROIs to LA-ICP-MS rasters. LA-ICP-MS analysis was also conducted on one Calcium-Aluminum-rich Inclusion (CAI) to compare trace element patterns with non-CAIs. Chondrules in AZ exhibit a weak foliation and lineation fabric similar to that observed in another CM2, Murchison. LA-ICP-MS analysis reveals that the studied CAI's FGR and local matrix seem to deviate from non-CAIs in trace element composition, particularly in Eu, Nd, Dy, and Tm. We investigate the nebula source of FGRs and matrix and their complementarity, providing insight into nebular conditions. Results suggest similarities with Murchison, including deformation fabric and nebular turbulence during FGR formation.



EDS false color SEM images of both scans. Highlighted regions indicate LA-ICP-MS map targets.

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