THE NATURE AND EXTENT OF THE FUSION CRUST IN CARBONACEOUS CHONDRITES.

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Introduction: The enormous diversity of materials forming the different groups of carbonaceous chondrites (hereafter CCs) has important implications on their bulk physical properties. The ability of a CC to ablate during atmospheric deceleration depends on its specific heat capacity and thermal conductivity, but both parameters are linked with their bulk properties [1]. We are setting up a project to study the thermal properties of chondritic materials by using a theoretical and experimental approach. We are particularly interested in studying the nature and extent of the fusion crusts of chondrites to get deeper knowledge in the ablation process and the role of the fusion crust in the conduction of heat towards the interior. In this way, by comparing theoretical models on the conductivity of the materials with the effects observed in real CC we hope to increase our knowledge on the ability of chondrites to ablate in the atmosphere.

Technical procedure: A high-resolution mosaic of the selected thin sections was generated from separate 50X images taken with a Zeiss Scope petrographic microscope. The mosaics allow us to study the sections with SEM FEI Quanta 650 FEG working in low vacuum BSED mode. The EDS detector used to perform elemental analyses is an Inca 250 SSD XMax20 with Peltier cooling with an active area of 20 mm^2. The previously selected areas were explored at different magnification, and SEM elemental mapping together with EDS spectra are obtained. We will compare the temperature gradients towards the meteorite interior with the thermal alteration experienced by some minerals in thin section. We have selected the following meteorites: Allende, LAR 04318, MIL 03377 and PCA 82500.

Conclusions: The temperature gradients of different chondritic materials can be determined. Then, by studying the fusion crust thickness and identifying mineral signatures of thermal alteration we would like to better understand the ablation mechanism for the different CC specimens. The fusion crust of the CCs studied has been formed in different dynamic circumstances under atmospheric deceleration and severe ablation of their rock-forming minerals in the atmosphere. By studying these fusion crusts and nearby areas using EDS mapping into detail we have observed that the CCs fusion crusts are highly vesicular in nature and also exhibit important bulk-rock variations. Probably the later is direct consequence of the high degree of heterogeneity in the components of these meteorites. In some cases, partially ablated fragments of chondrules or even refractory inclusions are found in the fusion crust, so the averaged bulk composition of the crust could be not representative of the full stone as previously found [2]. The meteorite heating seems gradational and then affects the meteorite components as a function of the depth.

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