Unveiling early accretion from the laboratory study of carbonaceous chondrites: clues for ongoing processes in protoplanetary disks

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Undifferentiated meteorites contain chemical and isotopic clues on the first processes leading to the accretion of planetesimals and cometesimals. In this invited talk I will describe the type of studies we are performing on the rock-forming materials of pristine carbonaceous chondrites that we are studying from the NASA Antarctic Collection. We can identify in these rocks primordial materials that are representative of the protoplanetary disk components floading around the Sun 4.6 Gyrs ago. Some of these materials, mostly as highly reactive and unequilibrated grains, are hosting unique properties, like e.g. the catalytic properties of sulphides and metal grains [1-3]. These condrites also contain amazing messages in a bottle, like e.g. the xenolith we discovered in a CR chondrite [4], providing information on pre-accretionary processes. The challenging properties of these rocks are also envisioned the key to trap volatile species in the void spaces of their matrices. Current studies exemplify the revolution in our current understanding that we expect from the sample return achieved from undifferentiated asteroids. It will increase significantly our knowledge of the first stages of solar system creation that we are observing in other planetary systems in formation. I will explain the relevance of all these laboratory studies on these materials in view of the new age opened by the study of protoplanetary disks using ALMA, SKA and other ongoing initiatives.

References

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