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Relict Grains with Fe Rich Olivine-Pyroxene Associations in Cosmic Spherules and their Links to Ordinary Chondrites

D. Fernandes[12*], N. G. Rudraswami[1] and M. Pandey[1]
[1]National Institute of Oceanography, India
[2]Goa University, India

Extraterrestrial dust that bombards the upper atmosphere comprises of diverse type of samples of different planetary objects like asteroids and comets, which accretes to Earth in the form of micrometeorites. Cosmic spherules are melted micrometeorites formed from melting of extraterrestrial grains due to frictional heating with air molecules. Precursors for cosmic spherules have therefore become difficult to determine since they are altered during atmospheric entry process. Relict grains are some of the least altered fragments found in cosmic spherules. Here we report unusual relict grains with association of olivine Fa >10 mol% and pyroxene Fs >10 mol% in three relict bearing cosmic spherules MS-I30-P156, MS-I31-P224, MS-I35-P274. These cosmic spherules have been separated using magnetic separation method, mounted in epoxy and examined in SEM and analyse in EPMA for their chemical composition.

Survival of relict grains with this chemical composition in cosmic spherule is complicated considering the temperature experienced by the cosmic spherules, as they are more susceptible to heat and can readily equilibrate with the melt. Olivine with Fa >10 mol% and pyroxene with Fs >10 mol% are common in chondrules found in equilibrated ordinary chondrites (EOC) and unequilibrated ordinary chondrites (UOC), but they are much more insignificant in carbonaceous chondrites. Relict grains in cosmic spherules are compared with olivines and pyroxenes with ordinary chondrites for their major and minor elemental distribution to assert the nature of parent bodies that contribute to relict grains in micrometeorites

Biography:

Dafilgo Fernandes is a 3rd year Ph.D. scholar registered at School of Earth, Ocean and Atmospheric Sciences, Goa University. He has a background of M.Sc. in Geology and at present works on Antarctica and deep-sea sediment micrometeorites. Dafilgo has been member of XXXV Indian Scientific Expedition to Antarctica which was aimed at extracting micrometeorites from blue ice. Since then, he has co-authored several scientific papers in peer-reviewed journals. His research work on micrometeorites primarily focuses on, investigating petrology and chemistry of Antarctica and deep-sea sediment micrometeorites.