THE SYNTHESIS OF INORGANIC AND ORGANIC COMOUNDS IN THE CIRCUMSTELLAR ENVIRONMENT

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Infrared spectroscopic observations of the circumstellar envelopes of AGB and post-AGB stars have identified a variety of inorganic grains, including amorphous silicates, crystalline silicates, silicon carbide, carbonates, corundum, spinels, and possibly rutiles. The existence of aromatic and aliphatic features and their associated plateau continuum suggests that organic compounds in solid-state form are also made during the post-AGB phase of stellar evolution. These features show similarity with the infrared spectra of kerogen, which are also found in meteorites.

The origin of the strong emission feature at 20 microns remains a mystery. Since its initial discovery by the IRAS satellite in 1989, now 12 carbon-rich post-AGB stars have been found to show this feature. The broad and smooth nature of this feature suggests that it is due to a solid. Although the 20-micron feature has been suggested to be due to hydrogenated fullerenes or titanium carbide nanoclusters, no firm identification has been made.

In this paper, we will summarize the spectroscopic evidence for inorganic and organic grains in the circumstellar environment and discuss the role they play in the chemical enrichment of the ISM, and possible pathways of their delivery to the solar system.