

Formation and alteration of presolar grains: Linking cosmochemistry, mineralogy, and astronomy

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Presolar grain is a rare component of primitive chondrites. Their highly anomalous isotopic compositions indicate that they are survivals of dust formed around evolved stars such as asymptotic giant branch stars, red giants, and supernovae prior to the birth of the sun. The presolar grain is a clue to understand variety of dust grains forming the solar system.

Isotopic measurement at high spatial resolution is essential to identify presolar grains of a few hundred nanometers and provides us information on their parent stellar sources. In addition, chemical composition, crystal structure, and morphology of presolar grains record their formation conditions and alteration process in the interstellar medium and the early solar system. Astronomical observations of circumstellar dust grains and gas molecules forming dust grains provide us general pictures of circumstellar dust formation processes, which is complementary to limited information deduced from individual grains.

In this talk, I review our recent studies on formation and alteration of circumstellar dust grains combining coordinated analysis on presolar grains using cosmochemical and mineralogical techniques with astronomical observations on dust formation around an asymptotic giant branch star.

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