

Presolar grains: Origin of the 21 micron emission observed around the post-AGB stars

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The carrier of the 21-micron band observed in the post-AGB stars is examined. We analyze the infrared spectra of the TiC clusters measured by von Helden et al. (2000, Science, 288, 313) and determine the absorption efficiency Q in the 21-micron band. Using the Q , we estimate the Ti/Si abundance ratios needed to realize the flux ratios of the 21- and 11-micron emissions observed in the infrared spectra of the post-AGB stars exhibiting both 21- and 11-micron emissions. In view of the nature of the TiC condensation that TiC grains are quickly mantled by graphite, we calculate the emission spectra of the graphite-coated TiC grains and other possible types of core-mantle grains, and compare with the observed spectra. Both of the abundance and condensation considerations strongly suggest that TiC is an implausible carrier of the observed infrared 21-micron feature around carbon-rich post-AGB stars.