THE 22 MICRON EMISSION FEATURE

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ABSTRACT

A broad 22 micron emission feature has recently been observed in H II regions and starburst galaxies (Chan and Onaka 2000, ApJ, 533, L33). The feature shape is similar to that of the 22 micron emission feature of newly synthesized dust observed in the Cas A supernova remnant (Arendt et al., 1999, ApJ, 521, 234). This finding suggests that both of the features are arising from the same carrier and that supernovae are probably the dominant production sources of this new interstellar grain. A similar broad emission dust feature is also found in the spectra of two starburst galaxies from the ISO archival data. This new dust grain could be an abundant component of interstellar grains and can be used to trace the supernova rate or star formation rate in external galaxies. Identification of the carrier of this new grain is not definite and several candidates (Mg protosilicate, Fe protosilicate, and FeO) can each provide a good spectral fit to the feature. However, from the recent ISOCAM observations we found that the observed 22 micron emission feature in Cas A is very likely contaminated by a warm silicate component, which is present all over the SNR. After subtraction of this warm silicate component from the observed spectrum of the 22 micron emission feature we found that the resultant feature is better fit by Ca protosilicate. Furthermore, Ca protosilicate gives a better fit to the observed 9.5 micron feature in Cas A than the other candidates.

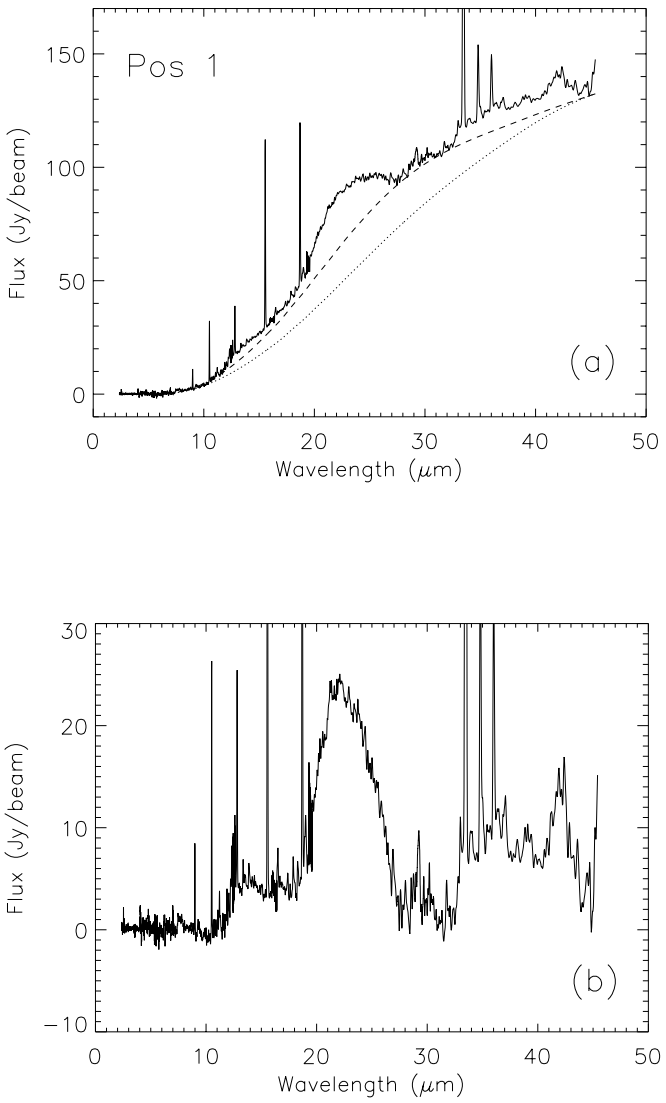

Figure 1. (a) The observed SWS spectrum of the Carina nebula at Pos 1. The dashed (dotted) line represents the continuum emission with graphite and silicate at 157 (160) and 40 (45) K, respectively. The spectrum was scaled to the shortest band in order to adjust the difference in the aperture size. The flux unit is Jansky (Jy) per beam with beam size of $14'' \times 20''$ *in the shortest band. (b) The resultant 22* μ*m feature after subtraction of the dashed line continuum emission.*