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A New Laboratory Produced of TIO and TIO2 Grains

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In O-rich stars the dominant dust grains are composed of amorphous silicates with evidence for a smaller population of crystalline silicates. Grain formation in the expanding, cooling gas around an AGB star is inherently a non-equilibrium kinetic process. After the very stable molecule CO, the most abundant oxide is SiO, which does not nucleate until the temperature is less than 600K. It is known from observations that dust nucleates at around 1000K in massive M-stars. Thus, it is the less abundant oxides such as TiO, AlO and Al2O3 are likely to be the first species to condense. The formations of these first condensates, which can then act as seed nuclei for the growth of nanoscopic grains, has been discussed in H. P. Gail and E Sedlmayr. (Farad. Disc., 109 (1998)303) Titanium forms a number of simple oxides, including TiO, TiO2 and Ti2O3, of which TiO has the largest bond energy and can therefore form and survive at high temperatures. TiO consumes almost all of the available Ti below 1600-2500K, which TiO2 is the dominant species for temperatures less than 1400K, independent of pressure. In the laboratory dust formation from Ti in oxygen gas pressure in the mixture gas of Ar, the TiO2 particles can be directly produced. But TiO dust can not be produced. In this paper TiO and TiO2 dusts are produced from TiC particle by introduction of oxygen gas in the flow of TiC smoke. Detail structures of TiC, TiO and TiO2 grains have been presented on the electron microscopy.