SILICON BEARING MOLECULES IN MOLECULAR CLOUDS

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We have used the IRAM 30-m telescope to make high angular resolution observations of the silicon-bearing molecule, SiO and SiS in region of massive star formation. We have mapped the J=2-1 and the J=5-4 lines of SiO with angular resolutions of 26 and 12″ respectively. For all the sources mapped, the SiO emission is more extended that the beam. The extreme cases are found toward NGC7538 and W49N where the SiO emission has sizes of 1x0.5 pc and 2.8x1 pc respectively. This result is in contrast with the size of the SiO region in Orion-IRc2 which is of the order 0.03 pc. The maxima of the SiO emission are found at the position of the H_2O masers. This indicates, as previously thought, that SiO emission probes the high temperature regions and/or the shocked gas and dust surrounding young stars. In the DR21(OH) region we have found the unique SiO source which is not associated to H_2O maser emission. This SiO condensation is 40″ south of DR21(OH) and it was first detected as a source of 350μm emission. The SiO emission is elongated in the east-west direction. From an analysis of the FIR continuum emission this object appears to be cool ($T_K < 30$) and it has been proposed that this source represents a pre-stellar condensation which may be evolving toward the star formation stage. The detection of SiO, howevwer, casts some doubts about the evolutionary stage of this source. Futher high angular resolution observations are necessary to establish the nature of this source.

SiS emission have been detected in the J=5-4 and J=6-5 lines toward the strongest radio continuum sources in Sgr B2, Sgr B2(OHM) and Sgr B2(OHN). The SiS lines are observed in emission. This is in contrast with the J=2-1 line of SiO which is observed in absorption against the continuum sources. Since the physical conditions required to excite the observed transitions of SiO and SiS are very similar, the SiO and SiS emissions arise from different regions. Absorption lines toward Sgr B2 seem to arise in a hot low density envelope. If the SiO absorption lines arise in this envelope, the SiO/SiS ratio in the diffuse envelope is $\gtrsim$60, somewhat larger than the cosmic O/S ratio.

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