# Dust formation around an oxygen-rich AGB star W Hya: SiO and CO observation with ALMA

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Silicates are the most abundant dust species around oxygen-rich AGB stars. The efficiency of silicate formation is a critical parameter for the dust-driven mass-loss from AGB stars [1]. Alumina ($Al_2O_3$) is refractory dust that condenses prior to silicates at higher temperatures. The abundance of silicates is expected to be ten times higher than that of alumina based on the cosmic abundance, which is consistent with the higher abundance of presolar silicates relative to presolar alumina [2]. Mid-infrared observations, however, showed that AGB stars with silicate-poor and alumina-rich dust shells are as common as silicate-rich stars [e.g., 3].

Condensation of silicate dust grains consumes SiO molecules in the gas phase. The abundance distribution of SiO in the envelopes will thus provide complementary information on the distribution of silicate dust and will directly place a constraint on the efficiency of silicate formation around alumina-rich AGB stars.

W Hya is a well-studied alumina-rich star and is one of the closest semiregular variables located at the distance of ~98 pc [4]. The abundance ratio of alumina to silicate dust was estimated to be ~0.6 by the MIR observation with ISO [5], which indicates that 90% of SiO remains in the gas phase beyond the silicate forming region.

We made an observation of a thermal emission line of $^{29}$SiO ($J$=8-7) to resolve the dust formation region around W Hya with ALMA during the cycle 3 observations. $^{12}$CO ($J$=3-2) and $^{13}$CO ($J$=3-2) lines were simultaneously observed as inert gas phases for silicate formation to monitor the structural change of the envelope as well.

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