P150a Hot Corino Activity in IRAS 15398−3359 at a 50 au Scale

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IRAS 15398−3359 is a low-mass Class 0 protostellar source in the Lupus 1 molecular cloud ($T_{\rm bol}$=44 K, d=155 pc). This source is known to be rich in carbon-chain species such as C_4H, C_4H_2, CH_3CCH, and HC_5N (Sakai et al. 2009). The infalling-rotating envelope and the Keplerian disk are identified by using the CCH and SO line emission, respectively (Okoda et al. 2018). Complex organic molecules including high excitation CH_3OH lines were not detected in the previous observations, and hence, it was recognized as a WCCC source.

We have conducted observations toward this source at a resolution of $\sim$ 50 au as part of the ALMA large project FAUST (Fifty AU STudy of the chemistry in the disk/envelope system of Solar-like protostars). We detect a few high excitation lines of CH_3OH toward the continuum peak position, among which the highest one is $20_{3,17} - 20_{2,18}$, A (E_u =373 K). This is the first detection of such a high excitation CH_3OH line in this source. The distribution is compact and slightly elongated along the north and south direction around the protostar (<80 au). Furthermore, the faint emission of $HCOOCH_3$ can be seen toward the continuum peak. Recent ALMA observations reveal some 'hybrid chemistry' sources where WCCC and hot corino chemistry coexist on different scales (e.g., B335; Imai et al. 2016 and L483; Oya et al. 2017). Our observational results suggest a hybrid chemical nature of IRAS 15398−3359.