A Cyanopolyyne-rich but COM-poor Massive Protostar: The First Hot Carbon Chain Chemistry Source G28.28-0.36

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The chemical diversity has been studied mainly around low-mass young stellar objects (YSOs). Three chemical types were proposed around low-mass YSOs: hot corino, Warm Carbon Chain Chemistry (WCCC), and hybrid-type sources. Recent ALMA observations toward massive young stellar objects (MYSOs) have revealed that cyanopolyynes coexist with complex organic molecules (COMs) in hot (> 100 K) gas. The Hot Carbon Chain Chemistry (HCCC) has been proposed as a formation mechanism of cyanopolyynes around MYSOs. The studied MYSOs likely correspond to hybrid-type sources. However, no MYSO corresponding to a *bona fide* HCCC source, where cyanopolyynes are abundant but COMs are deficient in hot gas, has been discovered yet.

We present ALMA Cycle 10 Band 3 data toward the MYSO G28.28-0.36 (G28.28; d = 3 kpc). Cyanopolyynes (HC_3N and HC_5N) and three complex organic molecules (COMs; CH_3OH, CH_3CN, and CH_3CHO) are detected from the MYSO G28.28. However, large COMs such as CH_3OCHO and CH_3CN_2CN are not detected. We compared the chemical compositions at G28.28 with those in the MYSOs previously studied, and found that G28.28 is the most cyanopolyyne-rich MYSO. In addition, COMs are deficient in G28.28 compared to the other MYSOs. The observed column density ratio of HC_5N/CH_3CN in G28.28 is consistent with a chemical network simulation at the hot-core stage with temperatures above 100 K. The results mean that the HCCC mechanism produces cyanopolyynes there. The ALMA data show that G28.28 is the first HCCC source identified so far.