

Abstract Submitted
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**Optical emission spectroscopy
of plasma-catalytic CO₂ methanation**¹ AKIHISA YAMAMOTO, MASASHI
IDEGUCHI, Kyushu university, SUSUMU TOKO, Tohoku university, KAZUNORI
KOGA, MASAHARU SHIRATANI, Kyushu university — CO₂ methanation has
been proposed to generate rocket propellant fuel in Mars exploration[1]. We aim
to establish CO₂ methanation process using plasma and catalyst. In our previous
study, we have proposed the model that CO₂ is excited and decomposed in the gas
phase and the methane is generated on the catalyst surface[2]. In order to clarify
the reaction processes more in detail, correlation between the emission intensity of
plasma and the CH₄ yield was investigated. The experiments were performed under
various conditions at a pressure of 3.5 to 8.0 Torr, with discharge power of 20 to
100 W, the electrodes of SUS, Cu and Ru/TiO₂ and the total flow rate of below 21
sccm. The CH₄ yield increases with the highest emission intensity of CO angstrom
bands during the methanation process. This result implies that the increase of high
energy levels of CO promotes CH₄ methanation. [1] G. Sanders, “Current NASA
Plans For Mars In Situ Resource Utilization,” no. 281, 2018.[2] S. Toko, et al. Sci.
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