

Abstract Submitted  
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**Spectroscopic study of CH<sub>4</sub> depletion in low E/N microwave discharges** DO IM, MILKA NIKOLIC, JANARDAN UPADHYAY, SVETOZAR POPOVIC, LEPOSAVA VUSKOVIC, Old Dominion University, Department of Physics, Norfolk, VA 23529 — Electron impact dissociation of CH<sub>4</sub> in plasmas has been attracting a continuous interest due to its high hydrogen content, which makes it potentially the most abundant source of hydrogen. Low E/N microwave discharges are applicable medium for oxygen-free, low temperature methane reformers and the promising candidate for the first practical application of plasma-assisted combustion. In present work we perform the optical emission spectroscopy (OES) of MW discharges in CH<sub>4</sub>/N<sub>2</sub> mixtures, which has also been of interest in the planetary atmospheric studies, especially in the case of the Jupiter's satellite Titan. OES is the simplest, but also the most challenging and modeling-intensive analytical technique, mostly due to the quenching of emitters at high pressure. In present study we compare quantitative methane dissociation evidence, based on the band intensities of methylidyne (CH), cyano radical (CN) and dicarbon (C<sub>2</sub>), and hydrogen Balmer line intensities. At low pressure, Balmer line emission proves to be useful as the CH<sub>4</sub> dissociation marker, but the alkyl and nitril band intensities are more reliable at higher pressures.

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