Temporally resolved plasma spectroscopy for analyzing natural gas components KAZUNOBU KOBAYASHI, Osaka Gas Co., Ltd., NAO-MASA TSUMAKI, TSUYOHITO ITO, Osaka University — Temporally resolved plasma spectroscopy has been carried out in two different hydrocarbon gas mixtures (CH$_4$/Ar and C$_2$H$_6$/Ar) to explore the possibility of a new gas sensor using plasma emission spectral analysis. In this experiment, a nanosecond-pulsed plasma discharge was applied to observe optical emissions representing the initial molecular structure. It is found that a CH emission intensity in CH$_4$/Ar is higher than that in C$_2$H$_6$/Ar. On the other hand, C$_2$ intensities are almost the same degree between CH$_4$/Ar and C$_2$H$_6$/Ar. This finding indicates that the emission intensity ratio of CH to C$_2$ might be an effective index for a gas analysis. In addition, a time for the highest emission intensities of CH and C$_2$ is several nanoseconds later than that of Ar. This result suggests that spectra from the initial molecular structure may be observed at the early stage of the discharge before molecules are fully dissociated, and this is currently in progress.

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