HGH-RESOLUTION NEAR-INFRARED ABSORPTIONS of CH_4/He PLASMAS

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Near infrared absorptions (11000-13000 cm^{-1}) of a gaseous plasma generated by discharging a gas mixture of He and CH_4 (at a ratio of 220:1 to give a total pressure of 860 mTorr) was studied using a high-resolution Ti:sapphire laser spectrometer. Using a home-built AC high voltage power supply and a 2 m long multi-traversal hollow cathode discharge cell equilibrated at 210 K, a peak-to-peak discharge current of 1-1.5 A was maintained for the plasma. The absorption signals were detected using phase-sensitive detection with concentration modulation at 5-10 kHz. In addition to the absorptions due to the Phillips band system (^1Pi_u – $^1Sigma_g$ electronic transitions) of C_2,[a] several unidentified bands were also observed with good signal-to-noise ratio. Based on the earlier work of Ballik and Ramsey,[b] and S. P. Davis et al.,[c] the analysis of the spectrum is underway.

[a] J. G. Phillips, *Ap. J.* **107**, 389 (1948).
[b] J. G. Phillips, *Ap. J.* **137**, 84 (1963).
[c] S. P. Davis, M. C. Abrams, J. G. Phillips, and M. L. P. Rao, *J. Opt. Soc. Am.* **B5**, 2280 (1988).