

EFFECT OF FLAME CHEMI-IONIZATION ON VISIBLE / UV EMISSION FROM SUPERSONIC FLOWS

SAURABH KESHAV, YURII UTKIN, IGOR ADAMOVICH, J. W. RICH, *Non-Equilibrium Thermodynamics Laboratory, The Ohio State University, Columbus, Ohio-43210.*

The effect of electrons produced in hydrocarbon-air flames by chemi-ionization on emission from a supersonic flow downstream of the flame is investigated. The air-fuel mixture (C_2H_4 -air) is ignited in the plenum of a supersonic nozzle at pressures of $P=300$ - 450 Torr. Ionization of the flow in the $M=3$ test section downstream of the nozzle is measured using a Thomson probe, by applying below-breakdown voltage to two plane electrodes flush mounted in the test section walls. In the saturation regime, the Thomson probe removes nearly all electrons generated in the flame by chemi-ionization. Previous use of this method in optically pumped $CO-N_2$ plasma sustained by a CO laser in a slow-flow absorption cell demonstrated that electron removal results in dramatic reduction of emission from the plasma (CN violet and C_2 Swan bands). In the present study, the effect of electrons on emission from the $M=3$ test section, CH (4300 Å band system), C_2 (Swan bands), CO (Angstrom bands), and OH ($A^2\Sigma^+ - X^2\Pi$ system), is monitored by an Optical Multichannel Analyzer with an ICCD camera.