Biomass Pyrolysis in a Heated Microtubular Reactor

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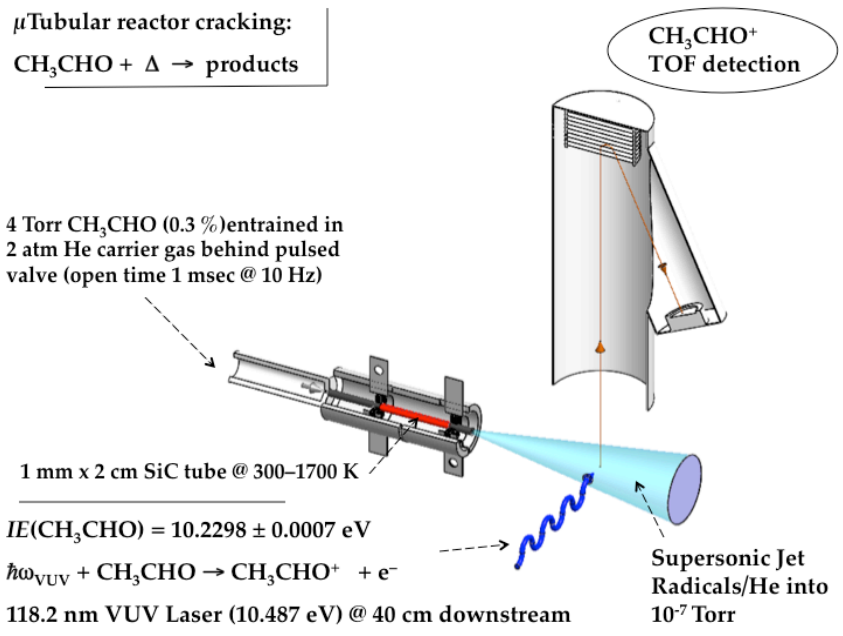
A heated SiC microtubular reactor has been developed to decompose biomass monomers such as CH_3CHO, C_6H_5OH, $C_6H_5OCH_3$, $HOC_6H_4OCH_3$, $C_6H_5CH_2CH_2OC_6H_5$, and furan. The pyrolysis experiments are carried out by passing a dilute mixture of the organic substrate (roughly 0.1 — 1 %) entrained in a stream of a buffer gas (either He or Ar) through a heated SiC reactor that is 2-3 cm long and 1 mm in diam. Common pressures in the reactor are 50 – 200 Torr and the SiC tube is heated in the range of 1200 — 1900 K. Typical transit times through the reactor are 50 — 200 μsec after which the gas mixture emerges as a skimmed molecular beam at a pressure of approximately 10 μTorr and all chemistry is quenched. The reactor has been deployed in pulsed and CW configurations. In Colorado a pulsed reactor is used because the pyrolysis products are identified by photoionization mass spectroscopy with a 10 Hz YAG laser at λ_0 = 118.2 nm or 10.487 eV. Separate experiments use matrix infrared absorption spectroscopy to identify the pyrolysis products and to confirm the assignments of the PIMS. In Calif. a CW reactor is used because a CW synchrotron is used as the light source for the PIMS. The pyrolysis of CH_3CHO will be discussed. We observe CH_3CHO (+M) → CH_3 + H + CO + CH_2=C=O, CH_2=CHOH, HC≡CH + H_2O.



THURSDAY