**Sooting Flames #4**

**Apparatus**

The central, sooting flame (ethylene/air) was stabilized above a water-cooled sintered bronze matrix. This flame is surrounded by a non-sooting “shielding flame” of methane/air ($\phi=1.68$). The flames were surrounded by an air coflow. The diameters of the central matrix, shielding matrix, and coflow duct were 41.3 mm, 61.3 mm, and 150 mm, respectively.

**Measurements**

Quantitative soot volume fraction measurements were obtained using laser-induced incandescence coupled with a quasi-simultaneous absorption measurement for calibration. The data were corrected for signal trapping using an "onion peeling" algorithm. A refraction index of $m=1.60-0.59i$ was used.

Temperature measurements were obtained using shifted vibrational coherent anti-Stokes Raman scattering, which yields well-resolved, accurate temperature measurements in sooting and non-sooting environments.

**Conditions**

*Pressure*: 1 bar

$\phi=2.3$ (C/O=0.766) – Fuel: 13.86 % - O2: 18.09 % - N2: 68.05 % - $V_0=7.74\text{cm/s}$

- Temperature profile
- Soot volume fraction

$\phi=2.5$ (C/O=0.834) – Fuel: 14.90 % - O2: 17.87 % - N2: 67.23 % - $V_0=7.84\text{cm/s}$

- Temperature profile
- Soot volume fraction

**Notes**

The shielding flame acts as a pilot flame and reduces heat losses by conduction and radiation. The cold gas velocities listed in the references are at 273K.

**References**