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Soot particles strongly absorb radiation in visible and infrared spectral regions, and their interaction with laser light during laser diagnostic interrogation leads to particle heating and often to subsequent sublimation. Consequently, laser-heated particles transfer heat to the ambient gas leading to local gas heating, a process that has received minor attention so far in the diagnostic community. In the present work, this specific local gas heating is measured in a pump-probe-type experiment. A 1064-nm laser beam heated the soot particles in a particle-laden flame with known soot volume fraction, and a two-beam rotational coherent anti-Stokes Raman spectroscopy (CARS) setup was used to probe the local gas temperature on time scales from nanoseconds to milliseconds. The particle temperatures were simultaneously probed using a two-color laser-induced incandescence (2C-LII) setup. The results show that laser heating of soot particles from flame temperatures to sublimation temperatures leads to local gas heating of ~100 K at a soot volume fraction of 4 ppm, in good agreement with theoretical predictions. The implication of these results to the application of various laser diagnostic techniques is discussed.

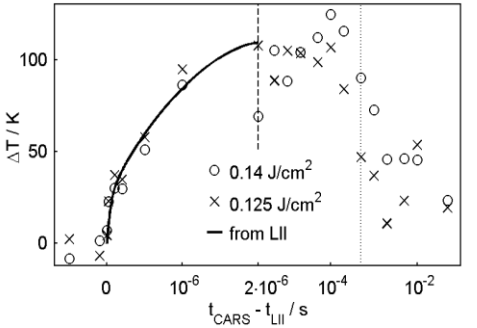

Figure 1
Evaluated gas temperatures at varying delay after the LII pulse for two measurement series.

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