Editorial

Per-Erik Bengtsson¹

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Laser-induced incandescence (LII) is—in the context of this special issue—thermal emission from particles resulting from heating by a laser, often a pulsed nanosecond laser. This thermal emission, i.e., incandescence, is mainly detected in terms of its absolute intensity or temporal decay, from which particle properties are estimated. A clear majority of all work on LII addresses soot particles, mostly in a flame environment. Besides soot, the LII technique is applied mainly to metal particles.

The first observations on LII were reported in the 1970s, followed by only few publications in the 1980s. A breakthrough for LII occurred in the 1990s, when extensive progress was obtained on quantifying LII signals and its uncertainties related to relevant input parameters. Further analysis in terms of particle concentrations and sizes was made possible by improved theoretical models of the physical processes.

Still today, work on LII remains challenging. The physical processes in the interaction between light and particles are intrinsically complex with partly unknown material properties especially at high heating temperatures, which is challenging from a theoretical as well as modeling perspective. Moreover, for experimentalists, extraction of LII signals from harsh luminous environments while keeping control of laser parameters such as the spatial energy distribution is a demanding task.

With these challenges in mind, researchers working with laser-induced incandescence realized the need for more focused interaction and exchange of ideas in this area of research, and the first LII workshop was arranged in Duisburg, Germany (2005). This workshop was followed by a series, in Bad Herrenalb, Germany, (2006), Ottawa, Canada (2008), Varenna, Italy (2010), and in Le Touquet, France (2012).

The sixth LII workshop was held at the island of Ven, Sweden, June 8–10, 2014. It gathered the majority of international researchers in the field. The 50 delegates contributed with 15 oral presentations, 20 poster presentations, and four discussion sessions. Based on the scientific results presented at this workshop, 15 peer-review papers have been accepted to document the state of art in “Laser-induced incandescence” in this special issue of Applied Physics B: Lasers and Optics. The articles span from more fundamental studies focused on theoretical issues to applications in practical turbulent combustion systems. An interesting evolution in the content of the present issue is the increased interest in optical properties of the particles being monitored by LII.

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✉ Per-Erik Bengtsson
per-erik.bengtsson@forbrf.lth.se

¹ Combustion Physics, Lund University, Lund, Sweden