Special issue: laser-induced incandescence

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Laser-induced incandescence (LII) has become a laser diagnostic commonly used for the concentration measurement and size characterization of nanoparticles. Most of the LII applications are related to the soot particle detection in combustion processes, but there is also a growing interest for monitoring non-soot nanoparticles during their synthesis process. LII technique allows instantaneous measurements of spatial distribution of soot volume fraction in combustion processes and in the exhaust gases. These measurements are very useful for understanding the chemical mechanisms in flames leading to soot nucleation, soot growth and soot oxidation and for environmental applications. Despite the large potential of LII technique, data interpretation is still confronted to the lack of knowledge of some physical parameters of nanoparticles and to the understanding of the complex physical processes occurring during the laser-induced nanoparticle heating and then during the cooling of nanoparticles.

In order to strengthen the community and to explore the development of best practices for LII modeling,

experiments and data interpretation, a series of workshops was initiated in Duisburg, Germany (2005), followed by workshops in Bad Herrenalb, Germany (2006), Ottawa, Canada (2008) and Varenna, Italy (2010). These workshops led to the publication of four special issues in Applied Physics B. In May 2012, the Fifth International Workshop and Meeting on LII was held at Le Touquet, France, to further the advancement of the fundamental understanding of LII.

This special issue contains 12 selected peer-reviewed papers presented at the workshop. These papers cover new refinements of LII modeling and of particle sizing, evaluation of thermal accommodation coefficients, impact of soot coating, sublimation and aggregation, approaches combining LII and laser scattering techniques, identification of soot nucleation, metal nanoparticle detection and environmental applications.

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