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Joachim Hein
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Introduction

Modern applications of lasers in science and industry always demand technology that is pushed to the limits. High peak power and high energy is required for research on laser plasma interactions, whereas high average power is needed for different kinds of material processing tools. Most often, high efficiency and maximum performance demands diode pumped solid state laser technology to be applied. Their foundation, namely laser diodes, are continuously improved as described in some articles within this volume. In the case of scientific applications, the emerging large scale facilities like ELI, Apollon, and HiLASE are undoubtedly pioneering new ground in the field. Consequently, many contributions in this volume originate with them and are reviewing the status of their laser systems and their new technology developments.

So far, high pulse energy and average power was mainly achieved in the near-infrared based on diode pumped Yb- and Nd-lasers like the 1 kW, 100 J laser Bivoj or DiPOLE of the Rutherford Appleton Laboratory, England and HiLASE, Czech Republic. On the high peak power side Ti:sapphire lasers like the Apollon laser at the Ecole Polytechnique, France are still the work horses. But in recent years a new trend can be observed: increasing the power and energy of mid-infrared sources, because these lasers have many applications in science and material processing as well as used in spectroscopy tools for pollution detection and similar tasks. This issue reflects this trend by covering research on mid-infrared lasers based on Tm, Ho, Er, and Fe doped host materials as well as the alternative approach via optical parametric amplification.

The expansion of high power lasers into new wavelength ranges in the deep-ultraviolet and mid-infrared and continuously raising their average and peak power always implies advanced laser materials and frequency conversion techniques. The conference 'High-Power, High-Energy, and High-Intensity Laser Technology' and its proceedings are dedicated to the presentation of all these novel enabling technologies that are needed to build even more powerful laser systems in future.

The committee of the conference acknowledges many contributions from the community and also four contributions from the 'Technology and Applications of Intense, High Average Power Lasers Workshop', that were added to this issue since they fit well in the modern approaches these proceedings are about.

Joachim Hein