

SYLA 2: 50 Years of Lasers II

Time: Wednesday 16:30–18:30

Location: E 415

Invited Talk SYLA 2.1 We 16:30 E 415
Our Daily Life with Semiconductor Lasers — •DIETER BIMBERG — TU Berlin

Semiconductor Lasers present an exceptional success story of breakthroughs in fundamental physics. A fundamentally new effect - stimulated emission from a p-n-diode - was observed at the time of discovery and quite some time afterwards at low temperatures only. By intelligent band structure engineering, however, the door was opened in 1970 by Alferov and Krömer for room temperature operation (Nobel Prize 30 years later in 2000). The following 25 years double heterostructure lasers became the enabling devices for intercontinental optical communication, the basis of the internet. 50 years after discovery, 2010, vertical and edge emitting semiconductor lasers, based on an ever increasing variety of material systems and nanostructures, operating from the UV to the middle IR, at very small mW or very large kW output power, present a backbone of modern energy efficient technology, being omnipresent in our daily life. DVDs, the optical mouse, the Terabus, the 100 G Ethernet, material processing, medical applications,... exemplify the ever increasing economic importance of the discovery of an orchid 50 years ago.

Invited Talk SYLA 2.2 We 17:00 E 415
Power to the Industry - the story of Laser upscaling — •REINHART POPRAWA — Fraunhofer Institut für Lasertechnik

Even first lasers were diffraction limited, single mode operation lead to fast applications in measurement and spectroscopy. However, it took quite a while to scale up power simultaneously maintaining the beam quality for good reasons. Especially in Gas - and Solid State Lasers the process lasted many years and is not finished, even today. After the presentation of CO₂-Lasers with average powers of up to 40 kW in the 90s, the challenge was passed on to the solid state community.

The response was a whole series of variants ranging from Rod-, Disk- to Slab- and Fiberlasers, also allowing short pulse power scaling. The simultaneous approach of power, time, wavelength and quality allows new sources for new applications not only by increased production speed, but even more important by advancement in the most relevant and general category: value.

Invited Talk SYLA 2.3 We 17:30 E 415
The Outstanding Qualities of Fiber Lasers and Thin Disk Lasers — •ADOLF GIESEN — Deutsches Zentrum für Luft- und Raumfahrt

In this summary the properties of fiber lasers and thin disk lasers are discussed in detail, showing that both designs are optimized solutions for building solid state lasers with outstanding properties. The advantages and also the disadvantages of each design will be explained and it will be shown that depending on the application the one or the other design will be advantageous. There is no either or, the question is what design is the best solution for which application. Some latest results and demonstrations will support this conclusion.

Invited Talk SYLA 2.4 We 18:00 E 415
Solid State Lasers: meeting the challenges of the 21st Century — •ROBERT L. BYER — Stanford University

In the fifty years since the demonstration of the laser, coherent light has changed the way we work, communicate and play. The generation and control of light is critical for meeting important challenges of the 21st century from fundamental science to the generation of energy.

A look back at the early days of the laser will be contrasted to the recent breakthroughs in solid state lasers and the applications to fundamental science of gravitational wave detection, remote sensing, and laser induced fusion for energy production.