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Introduction

2007 marked the 30th year after the first potentially realizable VCSEL was proposed, and just over a decade after the first commercial VCSEL products became available. Prior to 2007, the VCSEL commercial history had been overwhelmingly a story of data communications applications, almost all at 850 nm. Some time during 2007, however, other applications, particularly computer mice, began to use equal or greater numbers of VCSELs, and the long-predicted proliferation was officially afoot. In this, the 12th annual SPIE Photonics West conference on VCSELs, we find a wide range of current and potential VCSEL applications.

The VCSELs discussed in the presentations and in the papers in this volume cover half a dozen different wavelengths from the visible to 1.55 μm. Despite the VCSEL reputation for low maximum output power, arrays with cw power as high as 230 W in the infrared are described, as well as near-watt-level power in the blue and green through frequency doubling. In addition, results are presented for everything from single VCSEL elements to arrays of tens of thousands, and for speeds ranging from cw to 25 Gbps. The historical record of excellent VCSEL reliability was extended in the results of reliability testing of many of the variants.

In some ways the entire history of VCSELs is recapitulated in these papers, with structures both optically and electrically pumped, gain guides produced by oxidation but also by implantation, and novel structures such as coupled cavities and photonic crystals. Multiple solutions to typical problems are presented, for example four different, all successful, approaches to controlling polarization of the emission. Amazingly, all of these approaches have found or promise to find real application.

Overall, the papers in the 2008 VCSEL XII conference represent the current status of VCSEL development both in the research laboratory and in the commercial world, where VCSELs appear in tens of millions of systems each year—and growing.

James Guenter
Chun Lei