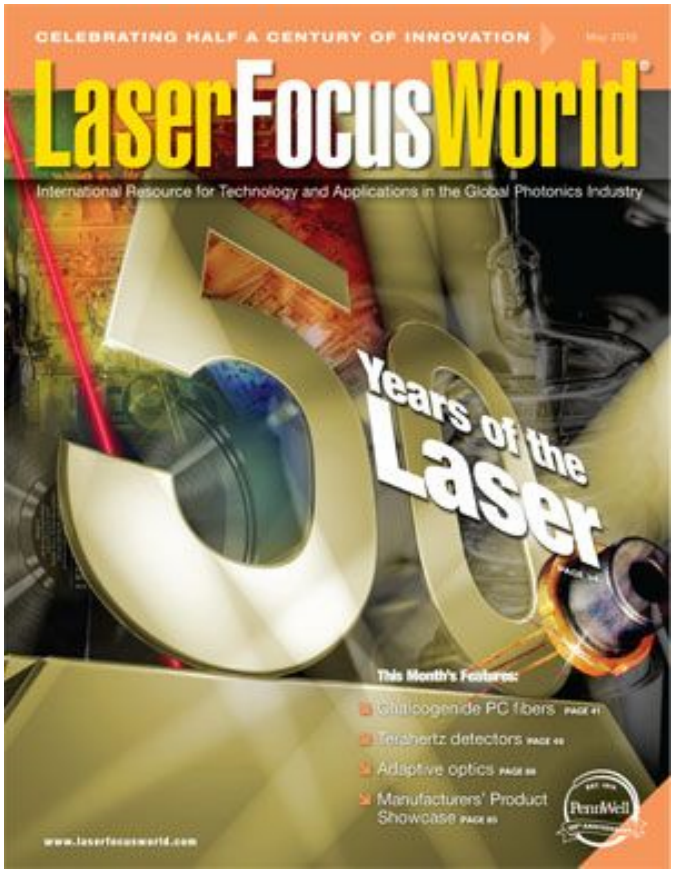

LASER FOCUS WORLD Volume 46, Issue 5 May 2010

Modelocked QD laser has switchable wavelength

Jun 1, 2010

Quantum-dot (QD) semiconductor lasers have both a ground state (GS) and an excited state (ES), due to quantization and strong inhomogeneous broadening of energy states. One consequence is the possibility of so-called two-state lasing. In addition, in two-section QD lasers with separated long gain and short absorber sections, modelocked picosecond pulses at high repetition rates of several gigahertz can be generated by applying a reverse bias to the absorber section. As a result, modelocked two-state lasing can occur, in which a transition from GS to ES emission in a modelocked QD laser is seen with increasing current, and even simultaneous lasing of both transitions at certain current levels.

The Semiconductor Optics group at Technische Universität Darmstadt (Germany) has now applied the so-called self-electro-optic effect to a QD laser. The group shunted the absorber section of a two-section QD laser with an ohmic resistor; by tuning the resistance, they showed that a transition of the laser wavelength from the ES to the GS could be achieved. For a 2 KΩ resistance, modelocking occurred on the GS at 1270 nm; the ES state was not lasing. Decreasing the resistance caused simultaneous lasing of GS and ES, and then caused the modelocked ES emission at a wavelength of 1207 nm to dominate. This simple concept allows the wavelength of modelocked pulses to be shifted on demand. *Contact Stefan Breuer at* Stefan.breuer@physik.tu-darmstadt.de.