AT0400220

F-QEO02 : Recent progress in diode-pumped mid-infrared vibronic solid-state lasers

*Vorgetragen im **Physik HS**, am Mo, den 23.Sept. von 16:20 bis 16:40*

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The last few years were marked by the increased interest of researchers towards the new class of transition-metal doped zinc chalcogenides [1]. In particular Cr:ZnSe attracts a lot of attention as broadly tunable continuous-wave (cw), mode-locked and diode-pumped lasers operating around 2.5 mm [2]. This interest is explained by the absence of other comparable tunable room-temperature laser sources in this spectral region. However, another member of the II-VI compounds family Cr:ZnS, has yet remained barely studied as a laser medium. Recently we demonstrated the first continuous-wave room-temperature tunable over more than 280 nm around 2.3 μm Cr^{2+}:ZnS laser, pumped with a Co:MgF2 laser and yielding over 100 mW of output power [3,4]. The most recent result is the development of a compact tunable over 700 nm continuous-wave room-temperature Cr^{2+}:ZnS laser, pumped by the diode-pumped Er-fiber laser at 1.6 μm and generating 0.7 W of the linearly polarized radiation. We also demonstrated direct diode-pumping at 1.6 μm of the Cr^{2+}:ZnS. Although the Cr:ZnS exhibited lower (relatively to the Cr:ZnSe) efficiency and output power due to the higher passive losses of the available Cr:ZnS samples, the analysis of the spectroscopic and laser data indicates the high potential of Cr:ZnS for compact broadly tunable mid-infrared systems, as well as for high power applications. The physics of the novel diode-pumped laser systems is highly interesting. It comprises the features of the ion-doped dielectric crystalline lasers and semiconductors. For example, we observe in these media, for the first time to our knowledge, a new nonlinear phenomenon, which is analogous to the opto-optical switching process, where the laser output of the diode-pumped continuous-wave Cr:ZnSe and Cr:ZnS lasers around 2.5 μm is modulated by only a few milliwatt of the visible (470-500 nm) and near-infrared radiation (740-770 nm). We present a physical explanation of the observed effect.

The work is supported by the FWF-Projects T-64, P14704-TPH and ISTC B-631.

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AT0400221

F-QEO03 : Novel rare-earth doped lasers: from crystalline towards crystalline fiber lasers

*Vorgetragen im **Physik HS**, am Mo, den 23.Sept. von 16:40 bis 17:00*

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An important group of rare-earth (RE) ions, operating in the mid-infrared spectral region at a whole number of wavelengths around 1.6, 2, and 3 and 4-5 μm includes such rare-earth ions