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Fiber Optics and Optical Communications

Compact vector twist sensor using a small period long period fiber grating inscribed with femtosecond laser *Fangcheng Shen, Xuewen Shu, Kaiming Zhou, Haiming Jiang, Hongyan Xia, Kang Xie, and Lin Zhang* 090601

Instrumentation, Measurement, and Optical Sensing

High sensitivity cascaded helical-core fiber SPR sensors *Xianbin Wang, Hongchang Deng, and Libo Yuan* 091201

Reconstruction of Fabry–Perot cavity interferometer nanometer micro-displacement based on Hilbert transform *Hongwei Liang, Yu Sun, Zhen Huang, Chunlei Jiang, Zihua Zhang, and Lingling Kan* 091202

Random Bragg-grating-based wavelength-tunable random fiber laser with a full-open cavity *Bing Lü, Wentao Zhang, Wenzhu Huang, and Fang Li* 091203

Review of femtosecond laser fabricated optical fiber high temperature sensors [Invited] *Dong-Ning Wang* 091204

Integrated Optics

Mode division multiplexing: from photonic integration to optical fiber transmission [Invited] [On the Cover] *Jiangbing Du, Weihong Shen, Jiacheng Liu, Yufeng Chen, Xinyi Chen, and Zuyuan He* 091301

Lasers, Optical Amplifiers, and Laser Optics

High power Yb-fiber laser amplifier based on nonlinear chirped-pulse amplification at a repetition rate of 1 MHz *Renchong Lü, Hao Teng, Jiangfeng Zhu, Yang Yu, Wei Liu, Guoqing Chang, and Zhiyi Wei* 091401

Contents continued

On the Cover

To overcome the capacity crunch of optical communications based on the traditional single-mode fiber, and to improve the density, efficiency, and interconnection capacity of photonic integration circuits, mode division multiplexing (MDM) becomes the most promising method for maintaining the trend of “Moore's law” in photonic integration and optical fiber transmission. In this tutorial, we provide a review of MDM works and cutting-edge progresses from photonic integration to optical fiber transmission, including our recent works on MDM low-noise amplification, few-mode fiber design, and MDM Si photonic devices. Research and application challenges of MDM for optical communications regarding long-haul transmission and short reach interconnection are discussed as well.

Stable noise-like pulse generation in all-PM mode-locked Tm-doped fiber laser based on NOLM	<i>Meng Wang, Minqiu Liu, Yewang Chen, Deqin Ouyang, Junqing Zhao, Jihong Pei, and Shuangchen Ruan</i>	091402
Theoretical analysis of periodically poled LiNbO ₃ nonlinear mirror and its application in a passively mode-locked Nd:YSAG laser	<i>Lina Zhao, Fangxin Cai, Luyang Tong, Ye Yuan, Wenyu Zhang, and Yangjian Cai</i>	091403
Enhanced optical absorption surface of titanium fabricated by a femtosecond laser assisted with airflow pressure	<i>Xun Li, Ming Li, and Hongjun Liu</i>	091404
GSA and ESA dual-wavelength pumped 2.3 μm Tm:YLF laser on the ³ H ₄ → ³ H ₅ transition	<i>Fei Wang, Haitao Huang, Haiwei Chen, Yushuo Bao, Zihan Li, and Deyuan Shen</i>	091405
Watt-level continuous-wave intracavity frequency-doubled Pr:YLF-LBO laser at 320 nm	<i>Yunshan Zhang, Jingyu Zou, Wanxin Zheng, Kai Feng, Bin Xu, and Zhenfang Yu</i>	091406
Rare-earth ions-doped mid-infrared (2.7–3 μm) bulk lasers: a review [Invited] [Editors' Pick]	<i>Hongkun Nie, Feifei Wang, Junting Liu, Kejian Yang, Baitao Zhang, and Jingliang He</i>	091407
Optical Design and Fabrication		
Micro-projection dynamic backlight for multi-view 3D display	<i>Baichuan Zhao, Ruiying Huang, and Guojiao Lü</i>	092201
Optoelectronics		
Avalanche mechanism analysis of 4H-SiC n-i-p and p-i-n avalanche photodiodes working in Geiger mode	<i>Linlin Su, Weizong Xu, Dong Zhou, Fangfang Ren, Dunjun Chen, Rong Zhang, Youdou Zheng, and Hai Lu</i>	092501
SNR improvement of 8.2 dB in a self-mixing laser diode interferometer by using the difference signal at the output mirrors [Invited] [Editors' Pick]	<i>Silvano Donati and Michele Norgia</i>	092502
Ultrafast Optics and Attosecond/High-field Physics		
Generation of 601 fs pulse from an 8 kHz Nd:YVO ₄ picosecond laser by multi-pass-cell spectral broadening	<i>Jiajun Song, Zhaohua Wang, Xianzhi Wang, Renchong Lü, Hao Teng, Jiangfeng Zhu, and Zhiyi Wei</i>	093201
Visual Optics and Displays		
High-speed playback of spatiotemporal division multiplexing holographic 3D video stored in a solid-state drive using a digital micromirror device	<i>Kohei Suzuki, Minori Tao, Yuki Maeda, Hirotaka Nakayama, Ren Noguchi, Minoru Oikawa, Yuichiro Mori, Takashi Kakue, Tomoyoshi Shimobaba, Tomoyoshi Ito, and Naoki Takada</i>	093301
Infrared and Terahertz Photonics		
Liquid crystal integrated metamaterial for multi-band terahertz linear polarization conversion	<i>Shitong Xu, Fei Fan, Hongzhong Cao, Yinghua Wang, and Shengjiang Chang</i>	093701

The color images are shown online.