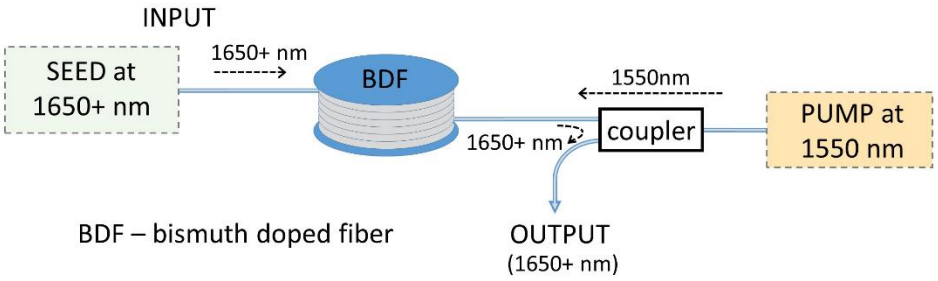
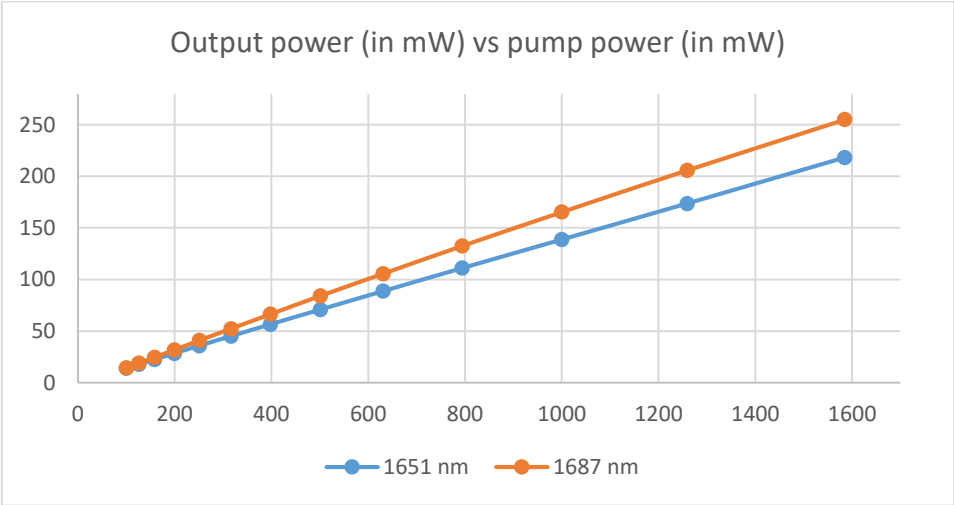
Optical signal amplification in the spectral range 1650 to 1750 nm

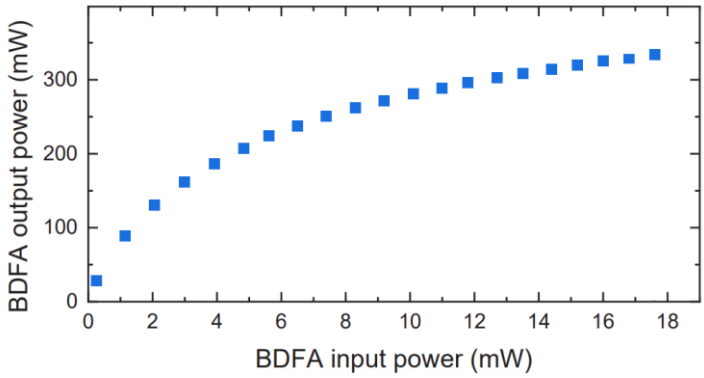
- **Bismuth-doped fiber amplifier (BDFA):**



Performance at 1651 and 1687 nm with a single pump source:



Performance at 1651 nm, with simultaneous front- and backward pumping:



More details and other results available in:

[1] Operation of a Single-Frequency Bismuth-Doped Fiber Power Amplifier near 1.65 µm, Photonics 7, 128 (2020) https://doi.org/10.3390/photonics7040128

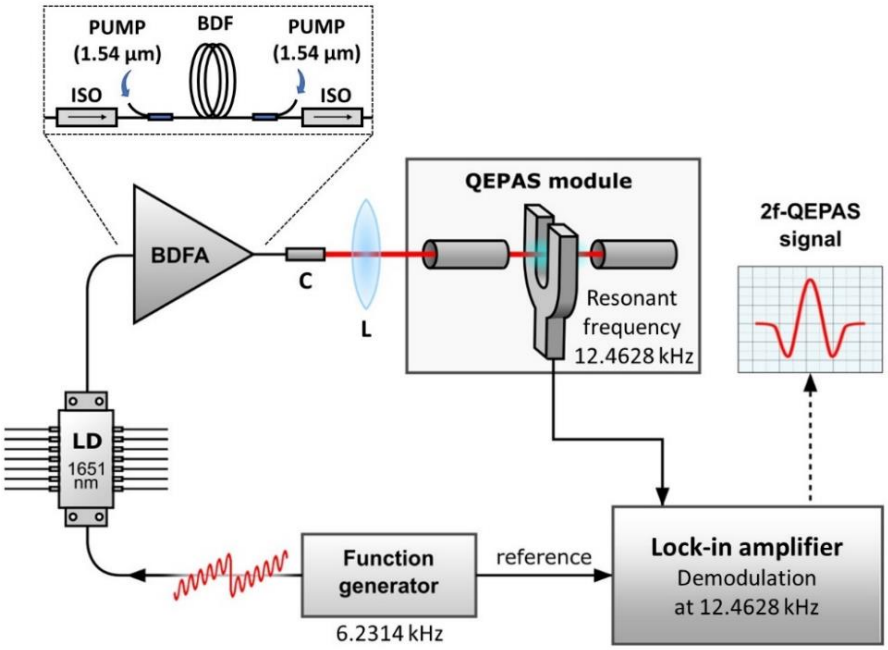
[2] Characterization of a single-frequency Bismuth-doped fiber power amplifier with a CW and modulated seed source at 1687 nm, Applied Optics 59, 1558-1563 (2020) https://doi.org/10.1364/AO.384413

[3] Single-frequency bismuth-doped fiber power amplifier at 1651 nm, Laser Physics Letters 16 (11), 115102 (2019), https://doi.org/10.1088/1612-202X/ab4d54

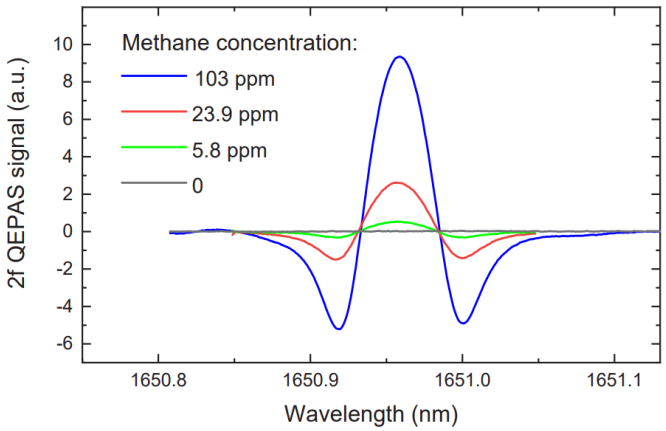
[4] Near-infrared quartz-enhanced photoacoustic spectroscopy system for ppb-level methane detection, Opt. Continuum 2, 266-273 (2023). https://doi.org/10.1364/OPTCON.477782

- **<u>Quartz-enhanced photoacoustic spectroscopy (QEPAS) with BDFA:</u>**

Experimental setup:



QEPAS signals for different gas samples:



More details and results available in:

Research Article Vol. 2, No. 2 / 15 Feb 2023 / Optics Continuum 266
OPTICS CONTINUUM

Near-infrared quartz-enhanced photoacoustic spectroscopy system for ppb-level methane detection

MAGDALENA ZATORSKA, GRZEGORZ GOMÓŁKA, AND MICHAL NIKODEM*

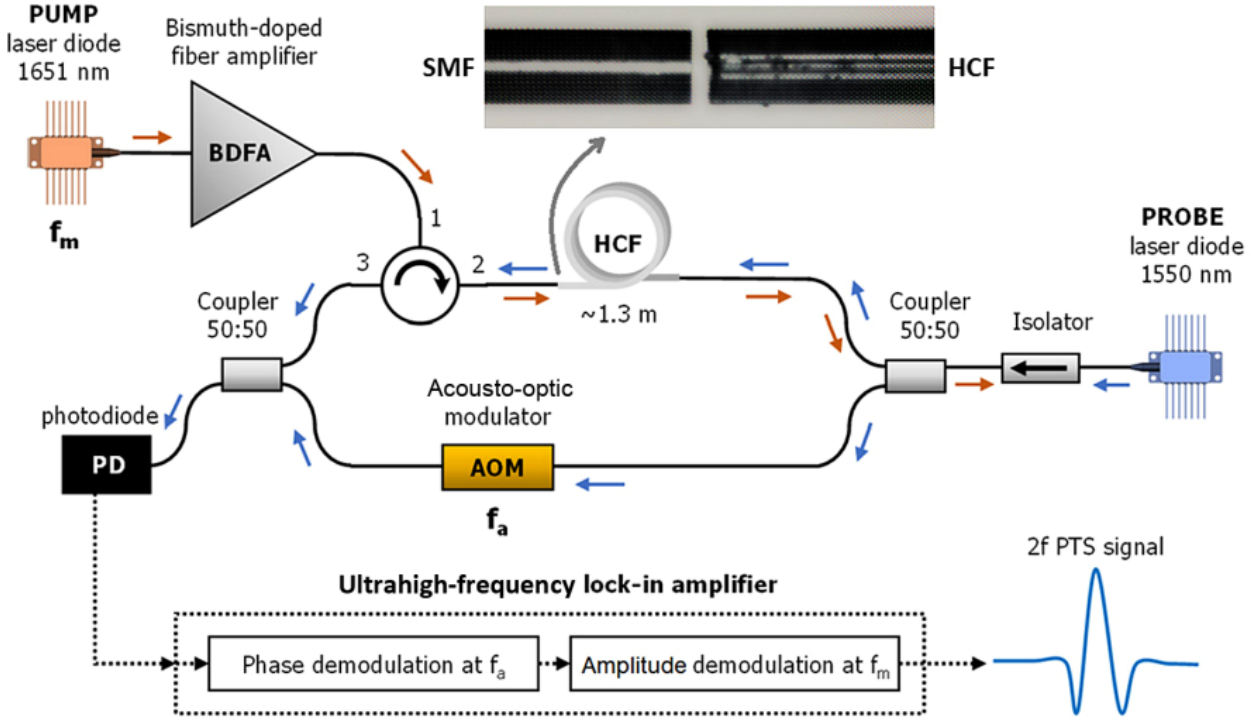
Department of Optics and Photonics, Wroclaw University of Science and Technology, Wroclaw, Poland
*michal.nikodem@pwr.edu.pl

Magdalena Zatorska, Grzegorz Gomółka, and Michal Nikodem, "Near-infrared quartz-enhanced photoacoustic spectroscopy system for ppb-level methane detection," Opt. Continuum 2, 266-273 (2023).

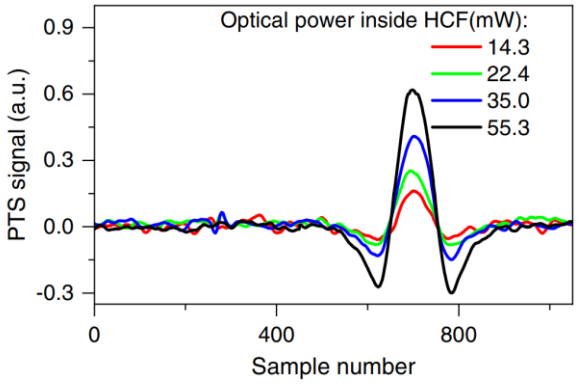
https://doi.org/10.1364/OPTCON.477782

- **<u>Photothermal spectroscopy with BDFA inside hollow-core fiber:</u>**

Experimental setup:



Photothermal specta measured near 1651 nm
(the sample was 125 ppm of methane inside 1.3-m-long hollow-core fiber):



More details and results available in:

C84 Vol. 60, No. 15 / 20 May 2021 / *Applied Optics* **Research Article**

applied optics

Heterodyne photothermal spectroscopy of methane near 1651 nm inside hollow-core fiber using a bismuth-doped fiber amplifier

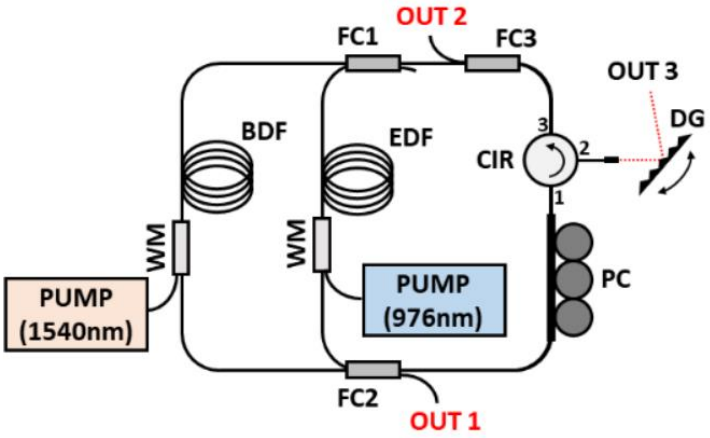
Grzegorz Gomolka,[1,†] Monika Krajewska,[1,†] Aleksandr M. Khegai,[2] Sergey V. Alyshev,[2] Aleksey S. Lobanov,[3] Sergei V. Firstov,[2] Dariusz Pysz,[4] Grzegorz Stepniewski,[4,5] Ryszard Buczynski,[4,5] Mariusz Klimczak,[5] and Michal Nikodem[1,*]

Grzegorz Gomolka, Monika Krajewska, … Michal Nikodem, "Heterodyne photothermal spectroscopy of methane near 1651 nm inside hollow-core fiber using a bismuth-doped fiber amplifier," Appl. Opt. 60, C84-C91 (2021)

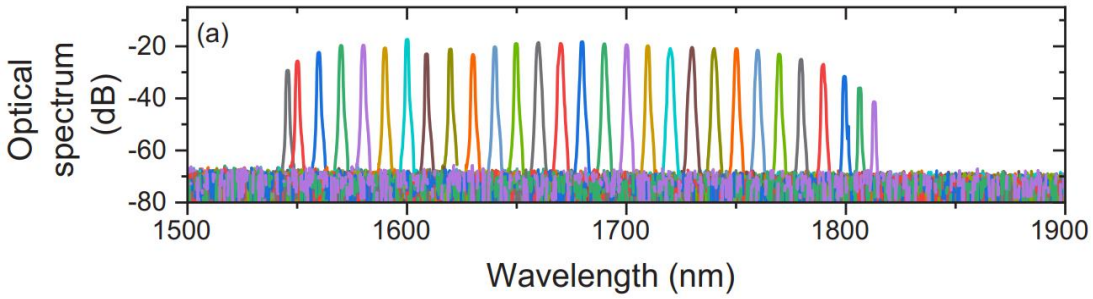
https://doi.org/10.1364/AO.420044

- **Widely tunable continuous-wave fiber laser:**

Experimental setup:



Output spectra measured at the 'OUT 2' output for different positions of the diffraction grating:



More details and results available in:

Research Article Vol. 30, No. 23 / 7 Nov 2022 / Optics Express 42300
Optics EXPRESS

Widely tunable continuous-wave fiber laser in the 1.55-1.8 µm wavelength region

PRZEMYSLAW CHMIELOWSKI AND MICHAL NIKODEM*

Department of Optics and Photonics, Wroclaw University of Science and Technology, Wroclaw, Poland
*michal.nikodem@pwr.edu.pl

Przemyslaw ChmielowskI and Michal Nikodem, "Widely tunable continuous-wave fiber laser in the 1.55-1.8 µm wavelength region," Opt. Express 30, 42300-42307 (2022)

https://doi.org/10.1364/OE.470378