

Study of supercontinuum generation in different nonlinear fibers

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This project includes the carbon-nanotube based passively mode-locked erbium-doped femtosecond fiber laser pulse generation and study of supercontinuum (SC) generation in different nonlinear fibers by launching the generated mode-locked femtosecond laser pulse. Here in this project, supercontinuum generation phenomena is studied at different input power levels in different nonlinear fibers such as highly nonlinear fiber (HNLf), photonic crystal fiber (PCF) and special fiber i.e. fluoride glass fiber (ZBLAN).

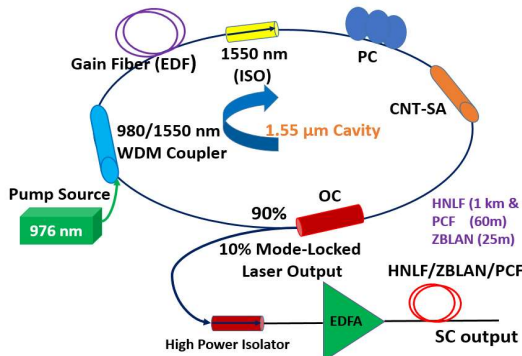


Fig. 1: Experimental schematic of passively mode-locked femtosecond pulse generation followed by supercontinuum generation in different nonlinear fibers.

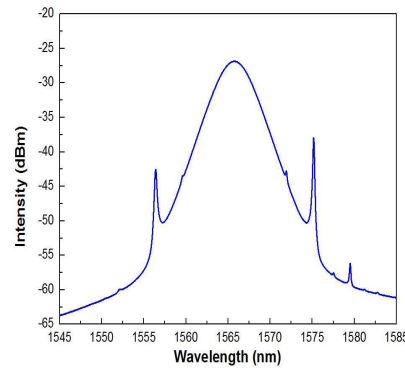


Fig. 2: Passively mode-locked laser pulse optical spectrum Centre wavelength ~1565 nm & 3dB bandwidth of 5 nm

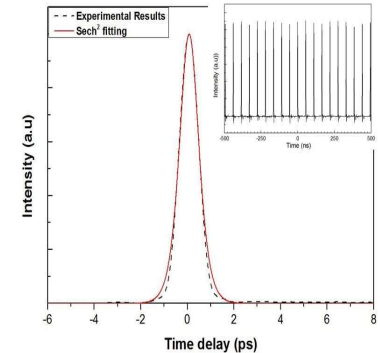


Fig. 3: Auto-correlation trace of mode-locked Pulse (Inset graph shows the RF spectrum mode-locked pulse) Pulse width = 570-600 fs & repetition rate = 18.3-18.5 MHz

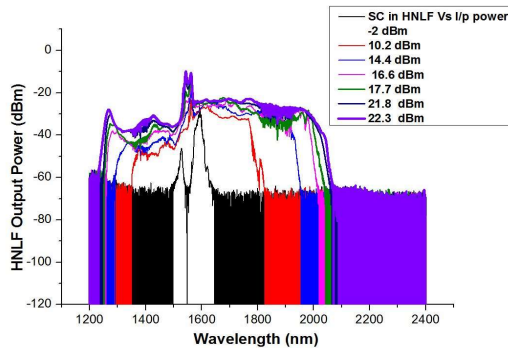


Fig. 4: Output SC spectrum of 1km length HNLf at different input powers

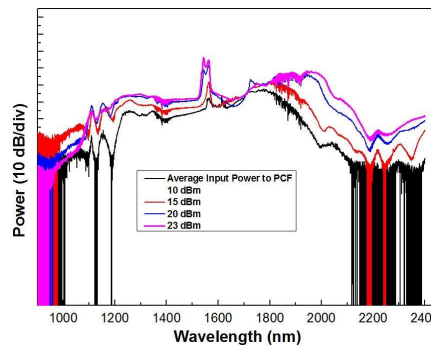


Fig. 5: Output SC spectrum of 60 m length PCF at different input powers

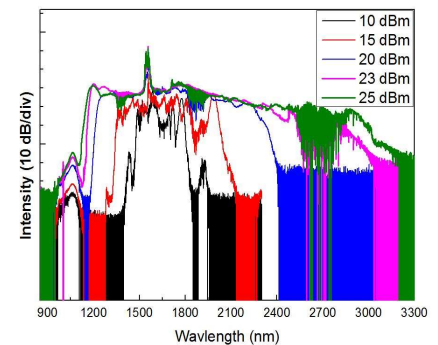


Fig. 6: Output SC spectrum of 25 m length ZBLAN fiber at different input powers

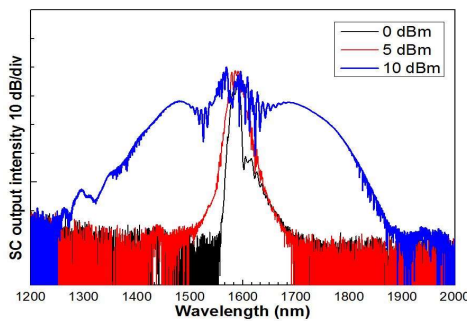
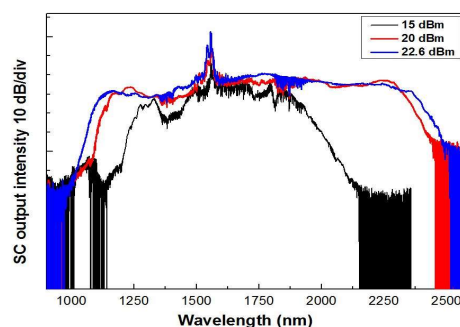


Fig. 7: Output SC spectrum of < 1m length HNLf at different input powers



Related Publications:

- Sivasankara Rao Yemini, Wenn Jing Lai, Alphones Arokiaswami, Ping Shum, "Mid-IR supercontinuum generation in a single-mode ZBLAN fiber pumped by a carbon-nanotube-based passively mode-locked erbium-doped femtosecond fiber laser", *Proc. SPIE 10516, Nonlinear Frequency Generation and Conversion: Materials and Devices XVII*, 105160N (15 February 2018); doi: 10.1117/12.2285315.
- Sivasankara Rao Yemini, Wenn Jing Lai, Alphones Arokiaswami, Ping Shum, "Flat broadband supercontinuum generation in a short length of highly nonlinear fiber pumped by a femtosecond carbon-nanotube based passively mode-locked erbium-doped fiber laser", *Proc. SPIE 10516, Nonlinear Frequency Generation and Conversion: Materials and Devices XVII*, 105160A (15 February 2018); doi: 10.1117/12.2283385.
- Sivasankara Rao Yemini, W. J. Lai, A. Arokiaswami and P. Shum, "Broadband supercontinuum generation in photonic crystal fiber pumped by femtosecond carbon-nanotube-based passively mode-locked erbium-doped fiber laser," *2017 Progress in Electromagnetics Research Symposium - Fall (PIERS - FALL)*, Singapore, 2017, pp. 2993-2995. doi: 10.1109/PIERS-FALL.2017.8293647.
- Sivasankara Rao Yemini, A. Alphones and S. Ping, "Broadband supercontinuum generation in highly nonlinear fiber with carbon-nanotube-based passively mode-locked erbium-doped fiber laser," *2017 IEEE Photonics Conference (IPC)*, Orlando, FL, 2017, pp.263-264. doi: 10.1109/IPC.2017.8116097.
- Sivasankara Rao Yemini, A. Arokiaswami and P. Shum, "All-fiber femtosecond laser pulse generation at 1.55 μm and 2 μm using a common carbon-nanotube based saturable absorber," *2017 Conference on Lasers and Electro-Optics Pacific Rim (CLEO-PR)*, Singapore, 2017, pp. 1-2.
- Sivasankara Rao Yemini, H. H. Liu and K. K. Chow, "Carbon-nanotube-based passively mode-locked erbium-doped fiber laser for broadband supercontinuum generation," *2015 10th International Conference on Information, Communications and Signal Processing (ICICS)*, Singapore, 2015, pp.1-4. doi: 10.1109/ICICS.2015.7459877.

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