Diploma thesis abstract:

«*Spectral transformation, stimulated Raman amplification and high-order Raman sideband generation in a fluorinated polymer waveguide on a printed circuit*»

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The ultrafast Raman response of C-H vibrations in polymer waveguides on a printed circuit is shown to enable a high-gain amplification and high-order stimulated Raman transformation of ultrafast laser pulses. The pump and Stokes field coupled by C-H vibration mode with a vibration cycle of 11 fs give rise to multiple Raman sidebands, suggesting the way toward ultrafast optical data processing and few-cycle optical waveform synthesis on a printed-circuit polymer waveguide platform.

Frequency-resolved optical gating measurements with a sub-10-fs time resolution demonstrate that optical non- linearities of fluorinated polymers (FPs) enable an ultrafast switching of ultra-broadband wavelength- and time-division multiplexed optical signals in the near-infrared (NIR) and short-wavelength infrared (SWIR) ranges. In the NIR region the operation bandwidth of fluorinated polymer thin-film switches is mainly limited by material dispersion. In the SWIR range material dispersion of fluorinated polymer is much weaker. Low group delay (less than 40 attoseconds per 1 mm of polymer thickness per 1 THz of data-packet bandwidth) allow ultrafast optical switching of subpetaherz data pockets.