Abstract Submitted
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Understanding the nonlinear-optical response of a liquid-core photonic-crystal fiber[1] ILYA FEDOTOV, Department of Neuroscience, Kurchatov Institute National Research Center, Moscow, Russia, VLADIMIR MITROKHIN, Center of Photochemistry, Russian Academy of Sciences, ALEXANDER VORONIN, ANDREY FEDOTOV, DMITRIY SIDOROV-BIRYUKOV, ALEKSEY ZHELTIKOV, Physics Department, International Laser Center, M.V. Lomonosov Moscow State University — Liquid-core waveguide structures have long been known and intensely used in nonlinear optics. Photonic-crystal fiber (PCF) technologies enhance performance and offer new functionalities of liquid filled waveguides as tools for nonlinear optics. We demonstrate a hollow core PCF that supports single-mode guiding at wavelengths longer than 600 nm in a 4-μm-diameter liquid-filled core, thus offering an attractive platform for nonlinear-optical experiments in the liquid phase. This PCF is employed to demonstrate that liquid-phase materials can radically modify the nonlinear-optical response of a waveguide structure relative to a typical nonlinear response of a silica waveguide. We show that the strong inertia of optical nonlinearity, characteristic of highly nonlinear liquid-phase materials, gives rise to a pulse-width dependent spectral red shift of the spectrally broadened fiber output. This wavelength shift remains strong even for pulse widths as large as several hundreds of femtoseconds.

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