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Fluorescence anisotropy excitation by polarization-shaped laser pulses after transmission through a kagome fiber

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Laser pulse shaping for control of photo-induced molecular processes has attained considerable success in recent years. It became most exciting when pulse shaper set-ups were employed to generate tailored pulses, which optimally drive the induced processes. Lately, polarization pulse shaping was explored to examine the vectorial character of the light field. Novel pulse shaping schemes for simultaneous phase, amplitude and polarization control were designed and a parametric subpulse encoding was developed. Thereby, the physically intuitive parameters like chirps and polarization states of subpulses can be controlled. This yields new perspectives of utilizing all properties of the light field in the pulse modulation. Currently, pulse shaping methods are increasingly used to investigate biologically relevant systems. Thereto, pulse shaping is applied to multi-photon excited fluorescence, which enables to exploit intrapulse interference effects. In this contribution improved fluorescence contrast between dyes is reported by two-photon excitation with polarization shaped laser pulses behind a kagome fiber utilizing the anisotropy of the dye molecules. Particularly phase and polarization tailored pulses were employed for two-photon excited fluorescence of dyes in liquid behind the kagome fiber. The distortions due to the optical fiber properties were precompensated to receive predefined polarization shaped pulses at the distal end of the kagome fiber. This enabled to optimally excite one dye in one polarization direction and simultaneously the other dye in the other polarization direction. The presented method has a high potential for endoscopic applications due to the unique properties of kagome fibers for guiding ultrashort laser pulses.

Biography

Albrecht Lindinger has earned his PhD on helium droplet spectroscopy in Göttingen in the group of J-P Toennies and completed his Post-doc term in Berkeley in the group of D Neumark. He received his habilitation in the field of coherent control at the Freie Universität Berlin in the group of L Wöste and is now working as a Lecturer in the Institute of Experimental Physics at the Freie Universität Berlin. He has published 80 peer-reviewed papers in reputed journals. His main scientific interests are laser optics, coherent control, and biophotonics.

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