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Recent progress on room temperature color center lasers and their applications for fluorescent kinetic spectroscopy

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Review on investigation and development of room-temperature stable color centers and tunable color center lasers will be done. Different oscillation modes of color center crystals: cw, nanosecond, pico- and femtosecond will be discussed. Comparison of laser parameters of color center crystals with Ti-sapphire and Cr-doped laser crystals for tunable operation are under consideration.

Number of now available color center lasers with very wide spectral region of tuning in near IR and visible under single line, multiline or superbroadband mode of oscillations with the manual or PC computer scanning will be outlined.

Multiyear experience of applications of room-temperature color center lasers for time resolved fluorescent laser spectroscopy will be analyzed. Narrow band, short pulse, resonant laser excitation of rare earth ions metastable levels in crystals and glasses provide excellent starting point for precise studying multi exponential and nonexponential fluorescence decay due to direct cross relaxation energy transfer, migration-limited energy transfer or spectral-spatial migration on stochastic ensemble of ions. Developed technique and great number of results on excited state solid's dynamic form very good basis for development of new sensitizers, up-converters and high concentrated laser materials.