Analysis of upconverted UV fluorescence dynamics in Nd$^{3+}$ doped ZBLAN glasses

R. Piramidowicz*, P. Witoński, M. Klimczak and M. Malinowski

Institute of Microelectronics and Optoelectronics, Koszykowa 75, 00-662 Warsaw, Poland

Rare-earth doped low phonon glasses are attractive media for unconverted, short wavelength fiber lasers. Fluorozirconate glass (ZBLAN) is one of the most popular representatives of this type of materials. Lasing in the visible part of spectrum has been reported in various upconversion pumped RE$^{3+}$ doped ZBLAN systems [1-2], but till now generation in the ultra-violet (UV) has only been observed in Nd:ZBLAN fiber [2].

The violet and UV fluorescence in different neodymium doped glasses has already been reported and analysed [3-5], however there are no detailed studies on the upconverted fluorescence dynamics.

In this work we investigate and discuss UV and violet emission dynamics under direct and multi-photon excitation in Nd$^{3+}$ doped ZBLAN samples of different concentrations (0.3, 0.9, 1.2, 2 and 5 mol. %) both in room and cryogenic temperatures.

A time dependent rate equation model, based on experimentally determined spectroscopic parameters, has been developed and applied to describe behaviour of the dynamics.

This research was supported by the State Committee for Scientific Research, grant no 4T11B 034 23.

References:

* Corresponding author e-mail: r.piramidowicz@elka.pw.edu.pl