

Title: Time-resolved spectroscopy of SiV centers in diamond

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Abstract:

In recent years, the negatively charged silicon center (SiV-) has become a promising competitor to well-established nitrogen (NV-) due to its excellent spectral properties, such as narrow zero phonon line transitions and weak phonon sidebands, and therefore, research of point defects in diamond is currently receiving a lot of attention. These isolated defects, the so-called color centers, can serve as sources of photons and thus, ultimately, can be used to construct SiV Lasers, whose physical nature is stimulated emission. However, it has not yet been generated at SiV centers. For its generation, it is necessary to examine in detail the radiant and non-radiative processes in optical centers and the properties and parameters of stimulated emission during optical excitation. Also part of the research is the optimization of sample preparation in order to obtain samples with a high concentration of centers and at the same time high optical quality.

That is why the aim of this diploma thesis will be to perform optical characterization of diamond samples with SiV centers (supplied by the cooperating department of the Institute of Physics of the AS CR) using continuous and especially time-resolved luminescence measurements at different temperatures (12 - 300 K). The samples will also be examined by time-resolved absorption (excitation and probing method). A tunable femtosecond laser system with pulses of 100 fs will be used to excite the samples.

Keywords: SiV diamond centers, time-resolved spectroscopy, luminescence spectroscopy, time-resolved absorption

