Optical bleaching in high-pressure-high-temperature diamond by visible-range femtosecond laser pulses

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Synthetic diamonds are very interesting optical platform for various application [1]. They contains a many types of nitrogen (N) and boron (B) impurities in substitutional atomic and low-aggregated forms [2]. Nowadays, the laser technology of direct writing of optically active centers in the volume of the diamond is well established [3]. However, the underlying potentially non-linear photoexcitation processes, the related electronic dynamics and the following atomistic transformations are still poorly investigated and understood. In this work, we report on a local optical bleaching of a red-colored synthetic high-pressure-high-temperature diamond. The arrays of bright micrometer-scale spots produced by femtosecond laser pulses was characterized by three-dimensional confocal photoluminescence microspectroscopy and Fourier-transform infrared microspectroscopy. This research is supported by the Russian Science Foundation (project No. 21-79-30063).

[1] Zaitsev A M *et al* 1995 *MRS Online Proc. Libr.* **416** 113
[2] Zaitsev A M 2013 *Optical Properties of Diamond* (Springer Berlin, Heidelberg)
[3] Chen Y C *et al* 2017 *Nat. Photonics* **11** 77–80