

Photon echo in the ensemble of semiconductor quantum dots spread on a glass substrate

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Abstract

Simple procedure to prepare samples containing semiconductor quantum dots was developed. Test photon echo measurements in the ensemble of quantum dots spread on a glass substrate were performed to study optical dephasing processes.

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References

- [1] Manykin E A and Samartsev V V 1984 Optical echo spectroscopy (Moscow: Nauka)
- [2] Vainer Yu G, Kol'chenko M A, Naumov A V, Personov R I and Zilker S J 2000 Photon echoes in doped organic amorphous systems over a wide (0.35-50 K) temperature range J. Luminescence 86 265-72
- [3] Naumov A V 2013 Low-temperature spectroscopy of organic molecules in solid matrices: from the Shpol'skii effect to laser luminescent spectromicroscopy for all effectively emitting single molecules Physics-Uspekhi 56 605-22
- [4] Magarian K A, Fedyanin V V, Karimullin K R, Vasilieva I A and Klimusheva G V 2013 Luminescence properties of CdSe nanocrystallites in cadmium alkanoate glasses J. Phys.: Conf. Series 478 012007
- [5] Karimullin K R and Naumov A V 2014 Dyes characterization for multi-color nanodiagnostics by phonon-less optical reconstruction single-molecule spectromicroscopy J. Luminescence 152 15-22
- [6] Salvador M R, Graham M W and Scholes G D 2006 Exciton-phonon coupling and disorder in the excited states of CdSe colloidal quantum dots J. Chem. Phys. 125 184709
- [7] Poltavtsev S V, Salewski M, Kapitonov Yu V, Yugova I A, Akimov I A, Schneider C, Kamp M, Hofling S, Yakovlev D R, Kavokin A V and Bayer M 2016 Photon echo transients from an inhomogeneous ensemble of semiconductor quantum dots Phys. Rev. B 93 121304(R)
- [8] Vainer Yu G and Gruzdev N V 1994 Dynamics of organic amorphous media at low-temperatures - an incoherent photon-echo study of resorufin in ethanol-d and ethanol-d(6) at 1.7-35 K 1. Experimental procedure and main results Optics and Spectroscopy 76 252-8
- [9] Knyazev M V, Karimullin K R and Naumov A V 2014 Using 2D-detectors in experiments on the photon echo Proc. Samara Sci. Center RAS 16 13-6
- [10] Karimullin K R, Knyazev M V and Naumov A V 2014 Photon echoes in an impurity polymer: New data on the low-temperature processes of phase relaxation and their relationship to the broadening of zero-phonon lines of single molecules Bull. Russ. Acad. Sci. Phys. 78 1254-9
- [11] Karimullin K R, Knyazev M V, Eremchev I Y, Vainer Yu G and Naumov A V 2013 A tool for alignment of multiple laser beams in pump-probe experiments Meas. Sci. Technol. 24 027002
- [12] Karimullin K R, Knyazev M V, Vainer Yu G and Naumov A V 2013 A luminescence visualizer for exact convergence of laser beams in photon-echo spectroscopy, four-wave mixing, and related techniques Optics and Spectroscopy 114 859-62