



## Millisecond fluorescence in InAs quantum dots embedded in AlAs

T. S. Shamirzaev<sup>a</sup>,   <sup>a</sup>, A. M. Gilinsky<sup>a</sup>, A. I. Toropov<sup>a</sup>, A. K. Bakarov<sup>a</sup>, D. A. Tenne<sup>a</sup>, K. S. Zhuravlev<sup>a</sup>, C. von Borczyskowski<sup>b</sup> and D. R. T. Zahn<sup>b</sup>

<sup>a</sup> Institute of Semiconductor Physics, pr. Lavrenteva 13, Novosibirsk 630090, Russia

<sup>b</sup> Institut für Physik, Technische Universität Chemnitz, Chemnitz D-09107, Germany

Available online 26 November 2003.

### Abstract

The temperature dependence of steady-state and time-resolved photoluminescence from self-assembled InAs quantum dots embedded in AlAs has been studied. Millisecond-long nonexponential photoluminescence decay is observed in the temperature range of 4.2–50 K. At higher temperatures, the decay time decreases to a few nanoseconds. The experimental results are interpreted using a model of singlet–triplet splitting of exciton levels in small dots in a dense quantum dot system with local carrier transfer between dots.

**Author Keywords:** Self-assembled quantum dots; Photoluminescence; Excitons; Singlet–triplet splitting

**PACS classification codes:** 78.67.Hc; 78.55.Cr; 71.35.–y



Corresponding author. Tel.: +7-3832-304475; fax: +7-3832-332771