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Temperature dependence of highly homogeneous excitonic spectra of site-controlled pyramidal quantum dots VALENTINA TRONCALE[1], Ecole Polytechnique Fédérale de Lausanne (EPFL), Laboratory of Physics of Nanostructures, CH-1015 Lausanne, EMANUELE PELUCCHI, Tyndall National Institute Lee Maltings, Cork, Ireland, ALOK RUDRA, ELI KAPON, Ecole Polytechnique Fédérale de Lausanne (EPFL), Laboratory of Physics of Nanostructures, CH-1015 Lausanne, LABORATORY OF PHYSICS OF NANOSTRUCTURES, EPFL, CH-1015 LAUSANNE TEAM — Site-controlled pyramidal quantum dots grown by MOVPE on patterned GaAs substrates offer many advantages such as emission wavelength, heterostructure tailoring and higher symmetry for efficient photon entanglement. We address the temperature dependence of X, 2X, X-, X+ exciton linewidths, providing insight on exciton-phonon interaction in this system. The investigated structures consist of GaAs/AlGaAs pyramidal QDs, positioned on 5μm centers, characterized using non-resonant micro-photolumionescence at low temperatures. PL spectra of individual QDs are highly reproducible, showing transitions excitons with inhomogeneous brodening as low as 2 meV, caused by slight thickness/composition fluctuations. Interferometric T-dependent linewidth measurements of the four excitonic transitions revealed values at T=0 K smaller than previously reported but larger than the estimated exciton radiative lifetime. We conclude that even at T=0 K the exciton decoherence time in GaAs QDs is not completely governed by a radiative lifetime and discuss this effect.

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