

We report a detailed experimental investigation of the power dependence of excitonic complexes neutral exciton, neutral biexciton, and charged exciton confined in single self-assembled GaAs/AlGaAs strain-free quantum dots grown by droplet epitaxy. By using the random population theory we show that, under stationary excitation, the power dependence of the excitonic complexes precisely follows the Poissonian statistics. This result allows us to determine with great accuracy the state filling condition of the quantum dots QDs and therefore to estimate the capture volume of the QDs.