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Unconventional gap state in lead sulfide quantum dots probed by photoinduced absorption[1] JASON LEWIS, JIAN ZHANG, XIAOMEI JIANG, University of South Florida — Infrared quantum dots such as PbSe or PbS have several attractive properties for use as photoactive material in optoelectronic devices. However, the performance of devices containing such quantum dots is yet to be improved significantly before viable commercial applications. One of the fundamental problems is the existence of trap states in these quantum dots, usually associated with imperfection in surface passivation during the colloidal synthesis process. Trap state usually has lies within the quantum dots bandgap, and continuous wave (cw) photoinduced absorption (PA) spectroscopy has proven to be a convenient and successful technique to study any below gap long-lived photoexcitations. We have recently measured the cw photoinduced absorption of four different sizes PbS quantum dots films on sapphire. In this work, we will present a complete study of size-dependent gap state PA spectra features, including spatial and temporal information of this gap state. We then attempted to interpret this confinement-dependent gap state is from trapped exciton.

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