

# Polydispersity in Colloidal InP Nanocrystal Quantum Dots: Insights Obtained from Dissolution Studies

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One of the most interesting properties of semiconductor nanocrystal quantum dots (NQDs) is their size-dependent optical and electrical properties. This property can be exploited for a wide range of applications including optoelectronics and photovoltaics.<sup>1</sup> InP NQDs have received considerable attention as a material of visible-light applications because they are relatively non-toxic compared with CdSe based NQDs. However, the quality of InP based NQDs in terms of optical properties, size uniformity and stability are still considered inferior to that of II-VI compounds. Because of the difficulties in synthesis, mechanistic studies of III-V NQDs formation are limited compared with II-VI.<sup>2</sup> For developing the synthetic method of InP NQDs with high quality, it is essential to investigate the reason behind the large size distribution and poor stability.<sup>3</sup>

Here, we investigated the dissolution of InP NQDs by systematically studying the dissolution and growth behavior of InP NQDs in solution. Particular focus is on dissolution as a function of QD size and the type of ligands in the solution, the relative ratio of ligand concentration and reaction temperature. The dissolution phenomenon and accompanied changes in size of the InP NQDs were studied in situ by UV-Vis absorption, TEM imaging, and ICP-Mass. Our results shed light on the behaviour of InP NQDs in the presence of coordinating ligands, which we believe is important in understanding the nucleation and growth of these NQDs.

## References

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