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Hydrothermal Synthesis and Photoluminescence of Boron Nitride Quantum Dots HONGLING LI, ROLAND YINGJIE TAY, SIU HON TSANG, EDWIN HANG TONG TEO, Nanyang Tech Univ — Boron nitride quantum dots (BNQDs), as a new member of heavy metal-free quantum dots, have attracted great interest owing to its unique structure as well as fascinating physical/chemical properties. However, it is still a challenge to controllably synthesize high quality BNQDs with high quantum yield (QY), uniform size and strong luminescence. Here we present a facile and effective approach to controllably fabricate BNQDs by sonoication-solvothermal technique. Encouragingly, the as-prepared BNQDs possess strong blue luminescence with high QY of up to 19.5%, which can be attributed to the synergic effect of size, surface chemistry and edge defects. In addition, the size of the BNQDs could be controlled with a narrow size distribution of 1.32 nm and the smallest average size achieved is 2.62 nm with an average thickness of ~ 3 atomic layers. Furthermore, the as-prepared BNQDs are non-toxic to cells and show nanosecond-scaled lifetimes and little photobleaching effect. Therefore, it is believed that BNQDs are promising as one of the novel heavy metal-free QDs for multi-purpose applications in a range of fields. Moreover, this synthesis concept is expected to open a new window to controllably prepare other heavy metal-free QDs, as well as to understand their luminescence mechanism.

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