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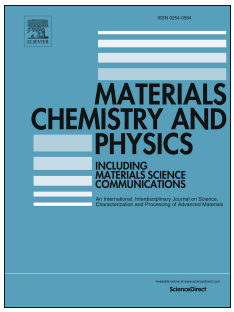

One-pot evaporation–condensation strategy for green synthesis of carbon nitride quantum dots: An efficient fluorescent probe for ion detection and bioimaging

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One-pot Evaporation–condensation Strategy for Green Synthesis of Carbon Nitride Quantum Dots: An Efficient Fluorescent Probe for Ion Detection and Bioimaging

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Abstract

Herein, highly blue graphitic carbon nitride quantum dots (g-CNQDs) were synthesized by one-step microwave-assisted evaporation–condensation strategy using bulk g-C_3N_4 as the precursor within 5 min. In contrast with conventional chemical routes, the as-synthesized g-CNQDs exhibited a high crystalline quality, excellent fluorescence characteristics, and a narrow size distribution with an average diameter of 3.5 ± 0.5 nm. More importantly, by using a household microwave oven, this method has the advantages of wide accessibility, environmental friendliness, a high yield of ~40%, and can be facilely synthesized in a large scale (scaled up to a gram scale). Notably, owing to the absence of any organic reagents, the blueas-prepared g-CNQDs show the excitation wavelength-independent photoluminescence (PL) behavior. Moreover, benefiting from the stable PL emission, good water solubility, and extraordinary biocompatibility with a high quantum yield of ~17%, the fluorescent g-CNQDs can serve as a potential sensitive and selective probe for Fe^{3+} detection with a super low detection limit of 2 nM and an effective labeling agent for live-cell imaging. This work provides a unique opportunity to obtain g-CNQDs in large scale via a facile route, which may pave the way for the further design of g-CNQDs with other applications.