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A facile and controllable protocol for simultaneous synthesis of magnetite nanoparticles and luminescent carbon dots

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Abstract:

Both magnetic Fe_3O_4 nanoparticles (Fe_3O_4 NPs) and luminescent carbon dots (CDs) were simultaneously synthesized via a hydrothermal route at temperature as low as 200□. The synthesized magnetic Fe_3O_4 NPs and luminescent CDs were readily separated and purified from the reaction mixture, without the need for additional energy input and chemicals. The magnetic properties of purified Fe_3O_4 and photoluminescence (PL) behaviors of purifi ed CDs were investigated using Squid-VSM magnetic property measurement system and fluorescence spectrophotometer, respectively. The size of Fe_3O_4 NPs and the luminescent properties of CDs were tunable by changing the reaction time or ratio between starting materials within a certain range. Fe_3O_4 NPs exhibited high saturation magnetization in the range of 36.59-68.22 emu/g and their magnetic behavior significantly depend on the size and structure of Fe_3O_4 NPs. This work was expected to provide a kind of green and high efficiency simultaneously synthesis of size-controllable Fe_3O_4 NPs and photoluminescence tunable CDs.

Introduction