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## Effect of adding reducing agent on the structure and optical properties of one-pot preparation method of CdTe quantum dots

By: [Wageh, S](#) (Wageh, S.)<sup>[1,2]</sup>; [Al-Amri, AMA](#) (Al-Amri, Ahlam M. A.)<sup>[1]</sup>; [Al-Ghamdi, A](#) (Al-Ghamdi, Ahmed)<sup>[1]</sup>

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### Abstract

One-pot and facile preparation of highly luminescent and water-soluble CdTe nanoparticles was reported. The CdTe nanoparticles were prepared using cadmium acetate as a source of cadmium, 3-mercaptopropionic acid as capping and stabilizing agent, potassium tellurite as a source of Te, and sodium borohydride as reducing agent. The effect of adding different molar percentages of sodium borohydride was investigated. The prepared nanoparticles were characterized by high-resolution transmission electron microscopy (HRTEM) with energy-dispersive X-ray, X-ray diffraction, UV-Vis absorption spectroscopy, and photoluminescence. The results indicated that the concentration of sodium borohydride had a significant effect on the phase structure, particle size, composition and luminescence of CdTe nanoparticles. With increasing sodium borohydride concentration, the Te/Cd atomic ratios of the prepared CdTe sample increased and the phase structure gradually changed from cubic and hexagonal mixed phase to pure hexagonal phase. Also, the luminescence intensity was greatly enhanced by decreasing sodium borohydride concentration. The prepared nanoparticles with low percentages of sodium borohydride are promising for light emitting device applications and biological labels. However, the samples prepared with high percentage of sodium borohydride might be possible to use as an effective material for applications in solar cells and photocatalysis.

### Keywords

**KeyWords Plus:** [MERCAPTOACETIC ACID](#); [THERMAL-DEGRADATION](#); [SOLAR-CELLS](#); [NANOPARTICLES](#); [CDSE](#); [NANOCRYSTALS](#); [PHOTOLUMINESCENCE](#); [EMISSION](#); [SULFIDE](#)

### Author Information

**Reprint Address:** Wageh, S (reprint author)

+ King Abdulaziz Univ, Dept Phys, Fac Sci, Jeddah 21589, Saudi Arabia.

**Reprint Address:** Wageh, S (reprint author)

+ Menoufia Univ, Phys & Engrn Math Dept, Fac Elect Engrn, Menoufia 32952, Egypt.

**Addresses:**

+ [ 1 ] King Abdulaziz Univ, Dept Phys, Fac Sci, Jeddah 21589, Saudi Arabia

+ [ 2 ] Menoufia Univ, Phys & Engrn Math Dept, Fac Elect Engrn, Menoufia 32952, Egypt

**E-mail Addresses:** [wageh1@yahoo.com](mailto:wageh1@yahoo.com)

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