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## One-pot synthesis of dual carbon dots using only an N and S co-existed dopant for fluorescence detection of $\text{Ag}^+$

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**Abstract:** luminescent carbon-based nanoparticles, named often as carbon dots (CDs), were synthesized from citric acid (CA) and guanidine thiocyanate (GITC) via an N and S co-doped hydrothermal procedure. In the present structure characterization, N and S elements could be sufficiently doped by means of the heteroatom or the functional groups bonded on the surface of CDs. The as-prepared CDs solution showed blue color fluorescence under ultraviolet excitation, yet the PL spectra exhibited a repetitive emission process from excitation-independent to excitation-dependent. In view of the triexponential feature of fluorescence lifetimes of CDs, one possibility was proposed to be co-existence of two types of CDs with different surface states. Additionally, the as-prepared CDs were used as a sensing probe for the detection of  $\text{Ag}^+$  taking into consideration of the possible interactions between  $\text{Ag}^+$  and various fluorophores attached to the CD surface. As expected, the changes of fluorescence intensities were linearly proportional to the different concentration ranges of  $\text{Ag}^+$ , which suggests the complex nature of the quenching mechanism. And for the first time, the  $-\text{S}-\text{C}\equiv\text{N}$  group was found to accelerate the quenching of CDs towards  $\text{Ag}^+$ , promising a new approach for efficient detection of  $\text{Ag}^+$  for the application in industrial pollutants.

### Keywords

S, N-CDs, co-existence, triexponential,  $\text{Ag}^+$ ,  $-\text{S}-\text{C}\equiv\text{N}$

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