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Title:	Surface-functionalized fluorescent carbon dots (CDs) for dual-mode detection of lead ions
Authors:	Bhardwaj, Sanjeev Kumar (/jspui/browse?type=author&value=Bhardwaj%2C+Sanjeev+Kumar)
Keywords:	Surface-functionalized Lead ions Fluorescent carbon
Issue Date:	2022
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Abstract:	In the present study, the highly fluorescent CDs, functionalized with 3-mercaptopropionic acid (3-MPA), were synthesized via a green chemistry route and subsequently employed as a dual-mode (fluorescence and turbidimetric) optical sensor probe (MPA@CDs) for Pb ²⁺ ions. The as-synthesized CDs (average size of 8 nm) exhibited bright-blue fluorescence with a quantum yield of around 16%. The addition of lead (Pb ²⁺) ions to the MPA@CDs solutions caused an enhancement in their fluorescence due to the strong interaction between MPA and Pb ²⁺ . This strategy has provided a "turn-on" type of sensing of Pb ²⁺ with a limit of detection (LOD) of 51 pM. Further, the reaction of MPA@CDs with Pb ²⁺ was characterized by a significant change in the solution turbidity. This visible detection method could analyze Pb ²⁺ with a LOD of 13.2 nM. Both the above strategies developed with the aid of MPA@CDs demonstrated high sensitivity and selectivity with the rapid response toward Pb ²⁺ ions even in the spiked real water samples. Therefore, the prepared nanosensor can provide a promising platform for the analysis of Pb ²⁺ ions in aqueous environmental and biological samples.
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