Abstract

The precise unification of functional groups and photoluminescence properties can give rise to metal complexes that can offer diverse applications like selective detection of nitro aromatic compounds (NACs) which are considered to be important ingredient of explosives.

In the present study, complexes were obtained by the reaction of cadmium chloride and 1,2,3,4-cyclopentanetetracarboxylic acid in different ratios and different solvents by reflux and hydrothermal methods. In [Cd(CPTA).(4-4 BPY).H_2O], Cadmium is four coordinated by two oxygen atoms [O(28) and O(29)] from CPTA ligand located at one carbon atom, one nitrogen atoms [N(10)] from 4-4 BPY ligand and one oxygen atoms from coordinated water molecule to generate square planer geometry. In [Cd(CPTA).2ETO], Cadmium is four coordinated by two oxygen atoms [O(18) and O(19)] from CPTA ligand and two oxygen atoms [O(1) and O(2)] from ethanol (ETO) ligand to generate square planer geometry. A systematic study is conducted on two metal complexes to investigate their photoluminescence properties and sensing behavior of various nitro aromatic explosives. The results show that both complexes are capable of detecting nitro aromatic compounds in the solution phase through fluorescence quenching.

On quenching with these nitro aromatic explosives, it was found that complex 1 is capable of sensing 4-nitroaniline having estimated K_{SV} (quenching constant based on Stern-Volmer plots) values are in the range of $13.2\times10^{-4}M^{-1}$. Complex 2 is found to be capable of sensing TNP having estimated K_{SV} value as $9.8\times10^{-4}M^{-1}$ calculated from the Stern-Volmer plot.