Mesoporous graphitic carbon nitride ($g-C_3N_4$); Fluorescent sensor for selective cyanide sensing

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Graphitic carbon nitride ($g-C_3N_4$) is the most stable allotrope at the ambient conditions among carbon nitrides, appealing class of materials that can complement carbon in various applications. $g-C_3N_4$ has recently attracted great attentions due to its semiconductor properties. Optical sensing system for cyanide ion was investigated using optical properties of nanostructured $g-C_3N_4$ which has adjustable electronic structure by coupling events of protons or metals to the surface functionalities such as $-NH_2$/-NH-/-N=. Especially, copper ions quenched the photoluminescence of mesoporous $g-C_3N_4$ with chelating onto the surface of $g-C_3N_4$. Copper ions react with cyanide ions and form stable complexes. Therefore, the quenched photoluminescence of mesoporous $g-C_3N_4$+ Cu is recovered by cyanide ions. The recovered photoluminescence of $g-C_3N_4$+ Cu is dependant on the concentration of cyanide ion. Cyanide is one of the most lethal poisons, and its human toxicity lies in its ability to inhibit the transport of oxygen from the terminal cytochrome oxidase to mitochondria. Limit of detection for this sensing system using mesoporous $g-C_3N_4$ for cyanide ion is below 100 nM which is satisfied with limit of World Health Organization (WHO).