
Self-Assembled Highly Fluorescent Copper Nanoclusters: A Novel Fluorescent Probes for the Detection of Histamine

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Abstract

Thiolated copper nanoclusters (Cu NCs) with self-assembly induced emission (SAIE) characteristic have been used as a novel luminescent material owing to its excellent photoelectricity properties. In this work, using 2,3,5,6-tetrafluorothiophenol as the protecting ligand we synthesized copper cluster, which were self-assembled to form nanoribbons (Cu NRs) with SAIE enhancement property. The Cu NRs exhibit intense saffron yellow luminescence with emission maximum at 590 nm, which was effectively quenched selectively by histamine. The size, electronic states, quantum yield of the nanocluster were characterized. And the morphologies of the Cu NRs before and after reaction with histamine were also investigated. The mechanism of the reaction of histamine with ligand protected Cu NCs was proposed. Finally, a rapid, sensitive, and selective sensing system for detection of histamine has been successfully constructed. Encouraged by the outstanding photoluminescence properties of Cu NRs, we demonstrated the application of the Cu NRs-based fluorescence test strip for colorimetric detection of histamine in complex samples, including fish, shrimp and wine.

Keywords: copper nanocluster, highly fluorescence, histamine detection

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