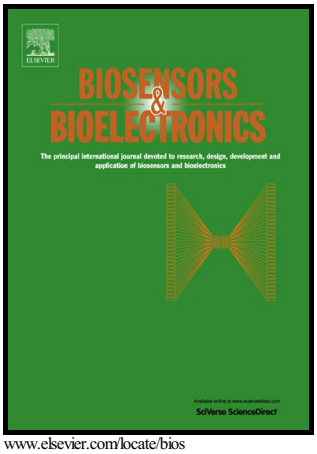

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ABSTRACT

Herein, we presented a facile strategy for highly sensitive and selective detection of both Cu^{2+} and histidine (His) by combining the peroxidase-like nanozyme activity of gold nanoclusters with amino acid's ambidentate nature. The peroxidase-like catalytic ability of histidine-Au nanoclusters (His-AuNCs) can be inhibited by the addition of Cu^{2+}. The sensitivity of this probe to Cu^{2+} is significant with a linear range of 1–100 nM, and a low detection limit of 0.1 nM. More interestingly, His-AuNC/Cu^{2+} undergoes recovery of the activity upon exposure to free His, because His/Cu^{2+} complex is more stable due to the participation of the imidazole ring of His. The method displays a good selectivity toward histidine over all the other amino acids, with a wide linear relationship in the range of 20 nM–2 μM, and a low detection limit of 20 nM. The feasibility of the probe for the rapid analysis of copper ion and His in human serum has been demonstrated with satisfactory results. With the merits of high sensitivity and selectivity, simplification, low cost, and visual readout with the naked eye, this novel 'turn-off/turn-on' sensing approach based on the amino acid's ambidentate nature is potentially applicable to metal ions, amino acids and peptides in biological and environmental areas.

Keywords: Nanozyme; Histidine; Gold nanocluster; Copper ion; Colorimetry; Ambidentate