Thiol Ligand-Assisted BSA-Capped Gold Nanoclusters for Hypochlorite Detection

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Nowadays, hypochlorite is mostly used as a sterilizer. However, long-term exposure or attaching hypochlorite may damage our body, while the announced hypochlorite detection method required toxic chemicals and tedious procedures, which is unsuitable for daily use. Hence, we use thiosalicylic acid-assisted BSA-capped gold nanoclusters (BSA/TA-Au NCs) to construct a portable detection method for hypochlorite. In addition, since COVID-19 broke out all around the world, hypochlorite has played an essential part as a sterilizer in daily life. We're also desirous to use BSA/TA-Au NCs to detect hypochlorite in the bleach, so that we can know whether the bleach definitely disinfects the environment. In this research, bovine serum albumin (BSA) and a series of thiol compounds (RSH) were applied to the synthesis of BSA/RSH-Au NCs. We changed the synthesis procedures and evaluated the stability to find out the most suitable one. Afterward, BSA/TA-Au NCs were selected for sensing hypochlorite in the livelihood. The linear range of hypochlorite detection was collected from 0.39μM-50μM, and the detection limit is 2.1μM, which covers the allowable residue hypochlorite levels of tap water and pool water as required by regulations announce by EPA. Eventually, the BSA/TA-Au NCs was applied to the hypochlorite sensing in the complex sample with high recovery from 99.16%. Furthermore, BSA/TA-Au NCs were successfully applied to a paper-based sensor. We can make a calibration curve by taking a photo with cellphones and analyze the fluorescence intensity. In conclusion, people can easily use our product to detect hypochlorite in the water.

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