FLUORESCENT GOLD CLUSTERS AS LABELS FOR THIOCYANATE SENSING

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Abstract

At present, it is known that nanosized materials display physical and chemical properties which greatly differ from those of macro-sized bulk materials. Particularly, glutathione-functional gold nanoclusters (AuNCS@GSH) exhibit fluorescent properties (λ_{em}=611 nm, λ_{exc}=396 nm), making them excellent candidates for sensor applications.

The effects resulting from the interaction between AuNCS@GSH and several anions (F^-, Cl^-, Br^-, I^-, NO_3^-, SO_4^-, SO_3^{2-}, CO_3^{2-}, SCN^- and HPO_4^{2-}) at different pHs were investigated by fluorescence measurements. Experiments are shown that the fluorescence intensity and the fluorescence lifetime of AuNCS@GSH were modified in the presence of trace quantities of the anions, the magnitude of which depended on the nature of the anion.

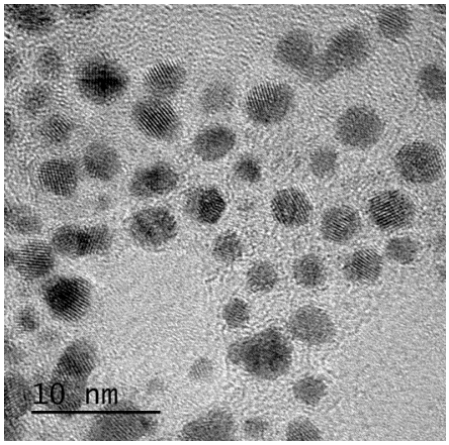
In brief, we followed, with minor modifications, the synthesis protocol described by Po-Han Li *et. al.* [1]. Morphological and spectroscopical characterizations were carried out. In the figure 1, we present a HRTEM image of AuNCS@GSH which reveals its morphology. These AuNCS@GSH present a great fluorescence emission which was also used to investigate their fluorescence lifetime. Both, fluorescence intensity and lifetime were used to evaluate the interaction between AuNCS@GSH and the anions described above.

Results demonstrated that interaction of AuNCS@GSH with SCN^- offers analytical potential for the anion determination. Saliva, as biological sample, was employed to demonstrate the applicability of the method. This procedure permits the identification of smoking teenagers because SCN^- is the principal detoxification product of CN^-.

References

[1] Po-Han Li, Ju-Yu Lin, Cheng-Tai Chen, Wei-Ru Ciou, Po-Han Chan, Liyang Luo, Hung-Yu Hsu, Eric Wei-Guang Diau, and Yu-Chie Chen. **Anal. Chem**.(2012), 84, 5484-5488.

Figures



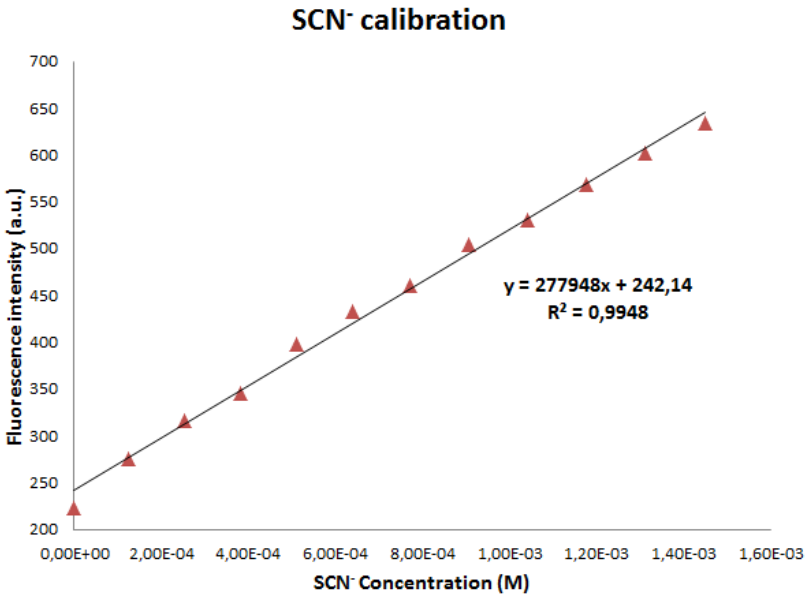


Figure 1: HRTEM image of AuNCS@GSH (average size: (3±1) nm).

Figure 2: SCN^- calibration by measuring AuNCS@GSH fluorescence.