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**Developing on-site Paper Colorimetric Monitoring Technique for
Quick Evaluating Copper Ion Concentration in Mineral Wastewater**

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Abstract

With the reinforce of the copper mining, the on-site monitoring of the accompanied effluent discharge is highly demanded for the emergency response to minimize the negative effect of the effluent on the surrounding ecosystem. On the basis of the specific interaction between Cu^{2+} and L-Cysteine (L-Cys), which was modified on gold nanoparticles (Au NPs), and the aggregation dependent surface plasmon resonance (SPR) of Au NPs, we developed an easy-on-going paper colorimetric method for the quick evaluating the copper ion concentration in the waste water excreted from the copper mine. The color change of L-Cys modified Au NPs (L-Cys-Au NPs) immobilized on a filter paper was very sensitive to the Cu^{2+} concentration and free of interference from other metal ions typically in waste water. The proposed paper colorimetry has the LOD of 0.09 mg/L and the linear range of 0.1-10 mg/L, respectively, with the RSD (n=5) was 6.6% for 1 mg/L Cu^{2+} and 3.5% for 5 mg/L Cu^{2+} . The quantitative analysis results for the mineral wastewater is in good agreement the *China National Environmental Protection Standards HJ485-2009*, which indicates the current method could be developed to the on-site detection technique for the emergency response in monitoring Cu^{2+} in industrial wastewater or polluted water.

Introduction

World widely, the exploitation of copper mineral deposits is reinforced year by year to meet the increasing demand for the copper metal. Meanwhile, the negative effect on the surrounding ecosystem, including the ecotoxicological impact on soil

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