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A Dihydropyridine Derivative as a Highly Selective Fluorometric Probe for Quantification of Au3+ Residue in Gold Nanoparticle Solution

Authors : Waroton Paisuwan, Mongkol Sukwattanasinitt, Mamoru Tobisu, Anawat Ajavakom

Abstract : Novel dihydroquinoline derivatives (DHP and DHP-OH) were synthesized in one pot via a tandem trimerization-cyclization of methylpropiolate. DHP and DHP-OH possess strong blue fluorescence with high quantum efficiencies over 0.70 in aqueous media. DHP-OH displays a remarkable fluorescence quenching selectively to the presence of Au3+ through the oxidation of dihydropyridine to pyridinium ion as confirmed by NMR and HRMS. DHP-OH was used to demonstrate the quantitative analysis of Au3+ in water samples with the limit of detection of 33 ppb and excellent recovery (>95%). This fluorescent probe was also applied for the determination of Au3+ residue in the gold nanoparticle solution and a paper-based sensing strip for the on-site detection of Au3+.

Keywords : Gold(III) ion detection, Fluorescent sensor, Fluorescence quenching, Dihydropyridine, Gold nanoparticles (AuNPs)
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