

Microanalysis System Based on Electrochemiluminescence Detection

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An electrochemical analysis system with microfluidic and sensing functions was developed. The microfluidic components consisted of a reaction chamber and hydrophilic flow channels with valves. The valves were formed as gold electrodes and were operated on the basis of direct electrowetting. A working electrode used to generate electrochemiluminescence (ECL) was formed in the reaction chamber. A solution that filled two injection ports could be injected into the reaction chamber simultaneously by opening the valves. When a solution containing an amino acid and a reagent solution containing $\text{Ru}(\text{bpy})_3^{2+}$ were mixed and a positive potential was applied to the electrode to generate ECL, red luminescence was observed. The luminescence intensity, measured using a photodiode, increased with increasing solution pH. The luminescence intensity also increased with increasing concentration of the amino acid. The lower detection limits were on the order of lower pM levels, and the scattering of the detected values of concentration increased as the concentration approached the detection limits.

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