Novel Detection of Acrylamide by Electrochemiluminescence Sensor and Optical Imaging Analysis

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Acrylamide, a carcinogen with debilitating effects on human health, was detected by electrochemiluminescence (ECL) measurement using Ru(bpy)₃²⁺ as the luminophore. Under the optimum conditions, Pt electrode as the working electrode showed a superior linear detection in the range 5 μM–10 mM, with a detection limit of 1.2 μM (S/N = 3). Moreover, a remote wireless camera was employed to collect the digital images of the ECL emission. These images were converted from RGB (Red, Green, Blue) model to HSV (Hue, Saturation, Value) model using the MATLAB software. It was found that Value (V) in the HSV model had a linear relationship with the logarithm of the acrylamide concentration, suggesting that acrylamide could be detected in levels of 5 μM using optical imaging. The ECL method for detecting acrylamide was proved to be simple and convenient. This is expected to lead to the development of a novel acrylamide detection method for food safety and other fields.

Keywords: electrochemiluminescence; acrylamide detection; optical imaging

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