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Suphasinee Sateanchok, Sunanta Wangkarn,
Chalermpong Saenjum, Kate Grudpan



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TAL-D-17-02338**A cost-effective assay for antioxidant using simple cotton thread combining paper based device with mobile phone detection**Suphasinee Sateanchok^{1,2}, Sunanta Wangkarn^{1,2}, Chalermpong Saenjum^{1,3} and Kate Grudpan^{1,2*}¹ Center of Excellence for Innovation in Analytical Science and Technology, Chiang Mai University, Chiang Mai, 50200, Thailand² Department of Chemistry, Faculty of Science, Chiang Mai University, Chiang Mai, 50200, Thailand³ Department of Pharmaceutical Sciences, Faculty of Pharmacy, Chiang Mai University, Chiang Mai, 50200, Thailand

* Corresponding author

Abstract

A cost-effective assay for antioxidant using simple cotton thread combining paper based device with mobile phone detection has been investigated. Standard and sample solutions flow along a bunch of cotton thread treated with sodium hydroxide via microfluidic behaviors without external pumping. The analyte solution reacts with the reagents that have been immobilized on the paper strip fixed at the end of the cotton bunch. The developed platforms were used for the assays of total phenolic content and antioxidant capacity by employing Folin-Ciocalteu and 2, 2-diphenyl-1-picrylhydrazyl (DPPH) respectively. Simple detection can be made by employing a mobile phone camera (iPhone 4S) with Image J or Photoshop for image processing and evaluation. Gallic acid was used as a reference standard in this work, as its polyphenol structures can be found in many plants. The total phenolic content is expressed as gallic acid equivalents (GAE) (mg/g material). Inhibition capacity is calculated by the equation: $\% I = [(I_0 - I_s) / I_0] \times 100$, where I_s is the relative magenta intensity (CMYK mode) of sample, and I_0 the relative magenta intensity of DPPH•. IC_{50} inhibition can be estimated from the graph and can be used for the antioxidant capacity consideration. Applications to the assay green tea samples were demonstrated. The total phenolic contents in the green tea samples were found to be 48 to 105 mg/g, with %RSD of less than 10 for that of higher 50 GAE mg/g and IC_{50}

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