

A novel colorimetric method for determination of formaldehyde using gold nanoparticles modified with 4-aminophenyl sulfone on paper based devices

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A new cutting-edge method for detection of formaldehyde was firstly developed. It used colorimetry based on aggregation of organic compound modified gold nanoparticles (AuNPs) in the presence of formaldehyde and its coupling agents. The selectivity of the system was achieved by implementing 4-aminophenyl sulfone as modifier and hydroxylamine hydrochloride as coupling agents under specific conditions. Due to an addition of formaldehyde, AuNPs changed its color from wine red to violet-blue. A platform for this reaction was paper-based devices in which offer advantages of simplicity, rapidity, and low price per an experiment. The results displayed on the paper devices were remarkably increased sensitivity by measurement of color intensity using ImageJ. Wide linear range from 40 - 110 ppm ($R^2=0.9979$) was obtained under optimized conditions with detection limit as low as 1.92 ppm. This work promises a successful application in real food samples with cost effectiveness, safe to use, and portability.

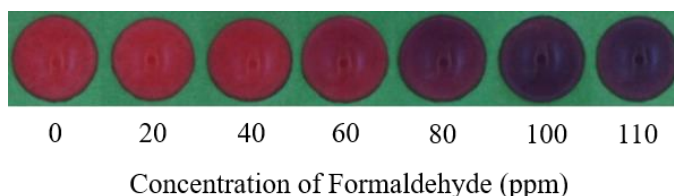


Figure 1. Visual color changes of modified-AuNPs in the presence of 0-110 ppm Formaldehyde.

Keywords: Colorimetric detection; Formaldehyde detection; Modified gold nanoparticle