

Article

Smartphone Coupled with a Paper-Based Colorimetric Device for Sensitive and Portable Mercury Ion Sensing

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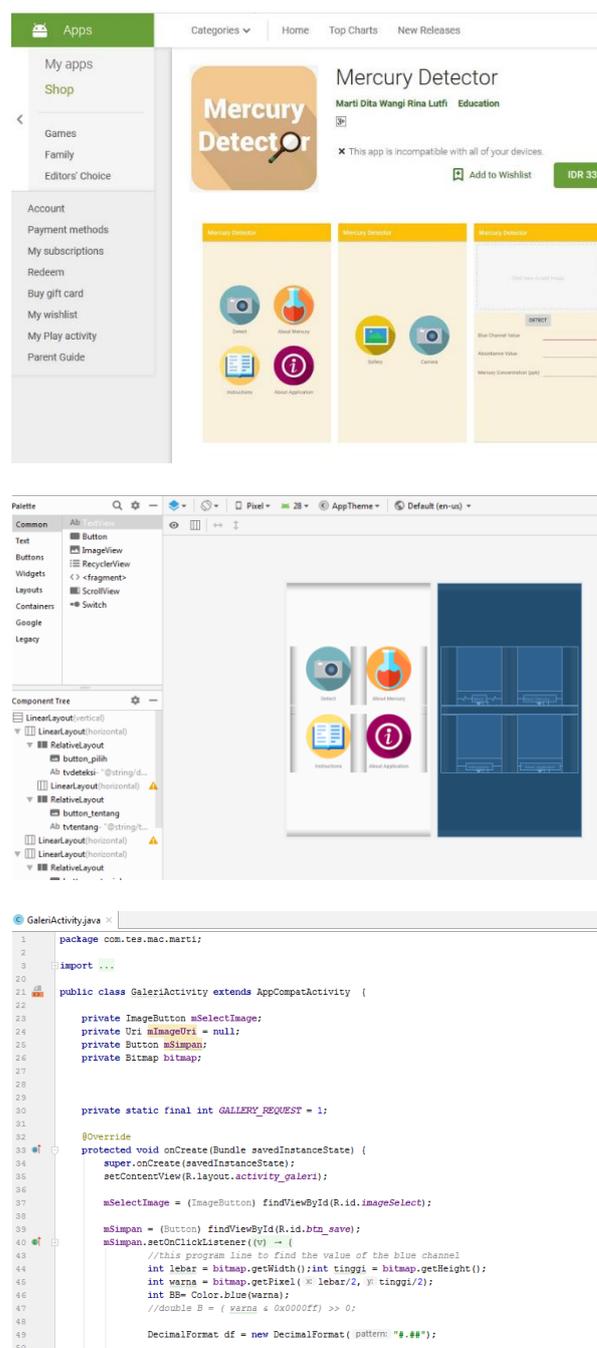


Figure S1. Examples of application appearance in Google Play Store and its corresponding android studio coding.

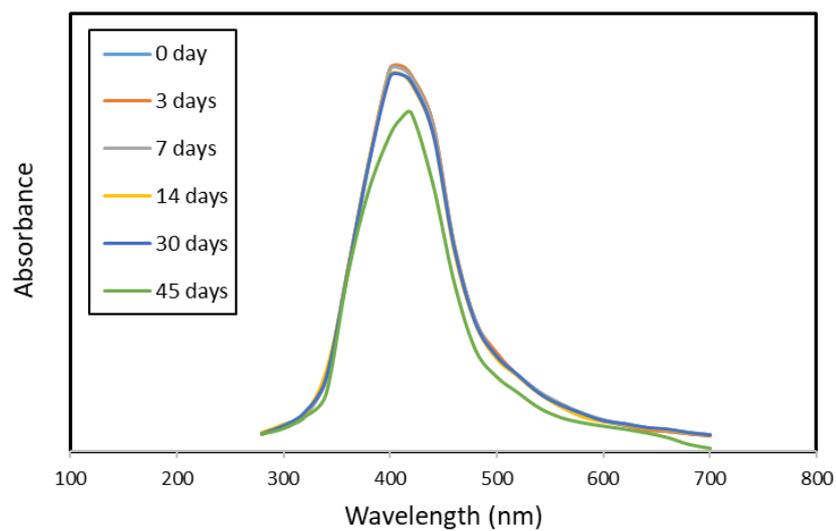


Figure S2. Color stability of the synthesized AgNPs through time. The synthesized AgNPs were stable for 30 days and started to aggregated at days 45 and on, as shown from the decrease of peak absorbance.

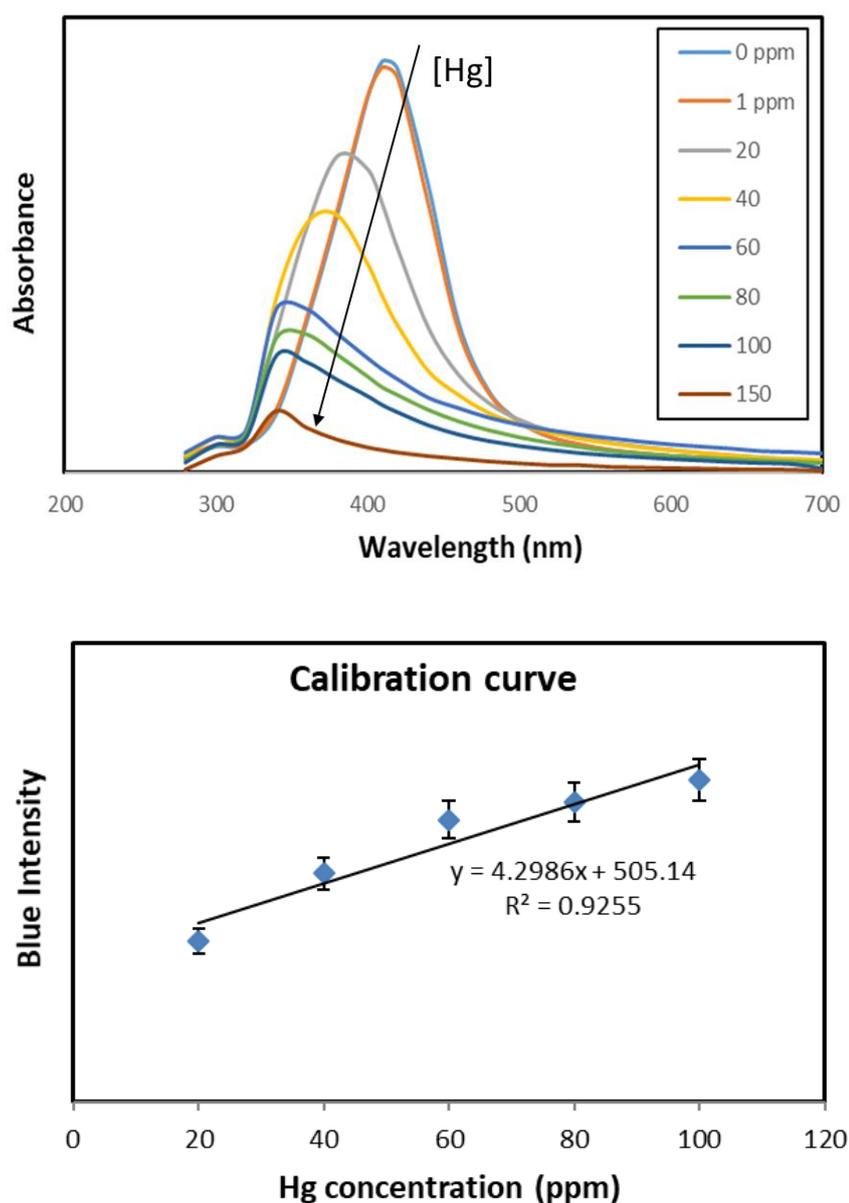
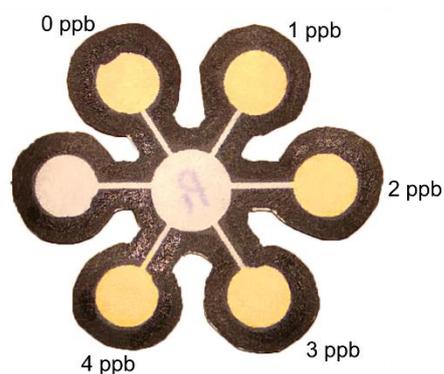


Figure S3. The plot of absorbance from spectrophotometer (upper) and its corresponding Blue intensity from digital image (below) of ppm-level mercury addition into AgNPs. Decreasing and gradual broadening on the absorbance of the surface plasmon resonance band, known as Mie blue shift, were noticed during successive addition of mercury ions into silver nanoparticles along with a blue shift from 420 nm for initial AgNPs to 360 nm upon addition of mercury ions. At high concentrations (ppm-level), analysis can be carried out both by spectrophotometry and by the digital image colorimetry as shown on the calibration curve below. At low concentration (ppb-level); however, analysis of mercury ions using spectrophotometry is impossible due to the visually similar color of the samples that produce very poor calibration curve on absorbance. Therefore, mercury at ppb-level was detected using digital image-based colorimetry.

Hg (ppb)	Color value		
	Red	Green	Blue
0	150.969	141.723	106.466
1	151.198	143.493	107.405
2	153.739	145.355	110.197
3	154.587	145.588	111.077
4	156.328	148.397	113.144



Hg (ppb)	Color intensity		
	Red	Green	Blue
0	0	0	0
1	0.658	5.390	3.814
2	7.896	10.990	14.959
3	10.285	11.685	18.413
4	15.149	19.985	26.421

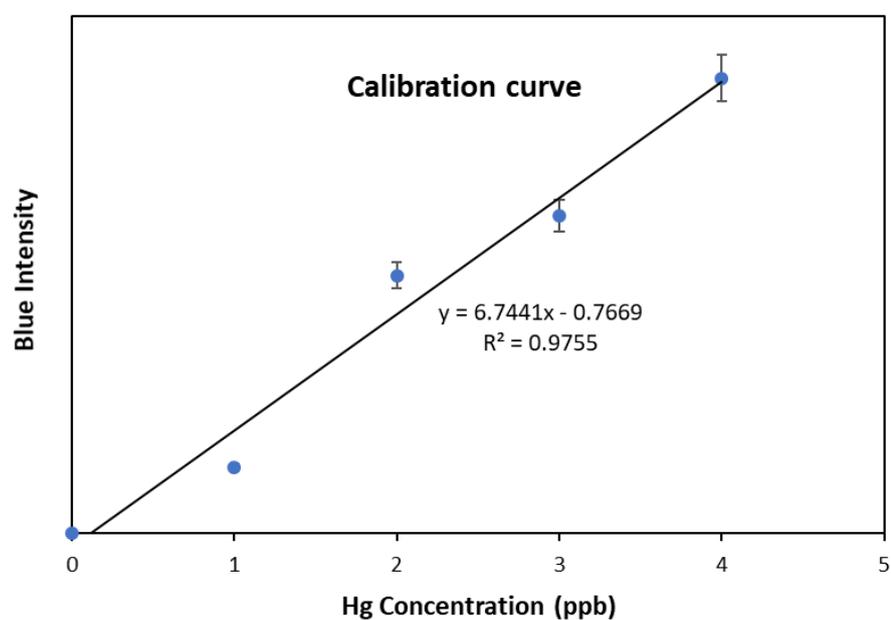


Figure S4. The actual photograph of PAD-based colorimetry together with its RGB value and Lambert-Beer logarithmic converted RGB intensity. The RGB color value was extracted from the digital image containing ppb-level standards (1 – 4 ppb). The other two chambers were used for samples. Corresponding calibration curve for this ppb-level mercury standards is also shown.