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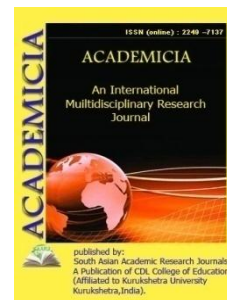
DETECTION AND SPATIAL MAPPING OF MERCURY CONTAMINATION IN WATER SAMPLES USING A SMART-PHONE

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ABSTRACT

The majority of bulky and expensive analytical equipment are used to detect environmental pollution such as trace-level hazardous heavy metal ions. However, there is a significant worldwide need for portable, quick, specific, robust, and cost-effective detection methods that can be utilized in resource-constrained and field environments. We present a smart-phone-based hand-held platform that enables for the measurement of mercury (II) ions in water samples with a sensitivity of parts per billion (ppb). We developed an integrated upto-mechanical connection to a smart phone's built-in camera module to digitally measure mercury content utilizing a magnetic gold powder (Au NP) and aptameric based colorimetric transmission assay applied in disposable test tubes for this purpose. We quantified mercury(II) cu(ii in water samples using a two-colourradiometric method using light-emitting diodes (LEDs) at 523 and 625 nm and a custom-developed smart application to process each acquired transmission image on the same phone to actually accomplish a limit of detection of 3.5 ppb with this 40-gram smart-phone attachment.

KEYWORDS: *Detection, Light, Measurement, Smartphones, Techniques.*

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