

Facile fabrication of paper-based analytical devices for rapid colorimetric detection of cesium in environmental samples

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Visual colorimetric sensors based on reusable substrates (cellulose, polyester, and non-woven fabric) are well-suited for the on-site detection and monitoring of environmental contaminants. Their ability to sense harmful substances rapidly will have a significant impact on a variety of danger warning and emergency response systems. Here, we report a promising method for detecting inactive cesium (Cs) through the observation of color changes in sensor strips impregnated with a Chrysoidine G (CG) chemo-indicator. This chemo-indicator is designed to exhibit a powerful detection capability featuring high selectivity and sensitivity to inactive Cs, by means of color discrimination from light yellow to red orange. Interestingly, a portable smart phone camera, which determined the relative red/green/blue (RGB) values within three seconds, provided us with further information on environmental pollution. Using our new colorimetric reusable sensor (CRS) platform, the CRS shows excellent detection linearity ( $R^2=0.97$ ) of inactive Cs from the contaminated water. Our results will pave the way for portable and versatile sensors and, in turn, for the detection and monitoring of toxic contaminants.