



309/C

Automated mechanism to detect glyphosate in well water

S A D A N Dissanayake,^{1*} H Pasqual¹ and B C L Atapattu²

¹Department of Electrical and Computer Engineering Department, The Open University of Sri Lanka, Nugegoda

²Department of Civil Engineering, The Open University of Sri Lanka, Nugegoda

Chronic Kidney Disease of unknown etiology (CKDu) is a crisis in the dry zone of Sri Lanka. Farmers in this region use chemical herbicides in paddy fields and glyphosate is one of the herbicides widely used. The amount of glyphosate used in the fields varies according to the wish of each farmer and the lack of awareness of farmers of the risk of this compound leads to excessive accumulation of chemicals in the soil. The excess fertilizers and herbicides ultimately end up in groundwater aquifers from which water is extracted for drinking. The complex of glyphosate can be considered as one of the suspects in the CKDu in the dry zone. Water analysis is mostly carried out in laboratories which cause delays in the results due to time taken for sample collection and transport. *In situ* measuring devices could reduce the delays due to sampling transportation and analysis.

According to potable water standard SLS 614:2013 stipulated by the Sri Lanka Standards Institution, the permissible phosphate level in drinking water is 0.05 mg L⁻¹. Analytical methods used to identify the orthophosphate in this range involve separation and detection. Of the different methods available for detecting phosphate concentrations in water, such as micro-column with ammonium molybdate, liquid waveguide capillary cell with vanadomolybdate and ion chromatography, ion chromatography is widely used to detect glyphosate. However, the vanadomolybdate method is more reliable for the onsite tests than the other recommended methods.

In this study, attention was focused on designing a sensing device for automated detection of glyphosate in water. Extracted water samples were mixed with the reagent of vanadomolybdate and the color development was measured using a light source with photo detector. A reference signal was used to compare the signal emitted by the sample. Signals from the photo detectors were transmitted to the microcontroller to indicate the glyphosate concentration level to the user. The development of this device would be useful to identify the risk of consumption of water extracted from any suspected source.

Keywords: Glyphosate detection, well water