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Development of Colorimetric Based Microfluidic Platform for Quantification of Fluid Contaminants

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Abstract : In this paper, a microfluidic-based platform for the quantification of contaminants in the water is proposed. The proposed system uses microfluidic channels with an embedded environment for contaminants detection in water. Microfluidics-based platforms present an evident stage of innovation for fluid analysis, with different applications advancing minimal efforts and simplicity of fabrication. Polydimethylsiloxane (PDMS)-based microfluidics channel is fabricated using a soft lithography technique. Vertical and horizontal connections for fluid dispensing with the microfluidic channel are explored. The principle of colorimetry, which incorporates the use of Griess reagent for the detection of nitrite, has been adopted. Nitrite has high water solubility and water retention, due to which it has a greater potential to stay in groundwater, endangering aquatic life along with human health, hence taken as a case study in this work. The developed platform also compares the detection methodology, containing photodetectors for measuring absorbance and image sensors for measuring color change for quantification of contaminants like nitrite in water. The utilization of image processing techniques offers the advantage of operational flexibility, as the same system can be used to identify other contaminants present in water by introducing minor software changes.

Keywords : colorimetric, fluid contaminants, nitrite detection, microfluidics
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