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IIT-M develops pocket-friendly device to detect milk adulteration in 30 secs

The 3D paper-based portable device could be easily adapted for use in homes

By **Manbeena Chawla** | March 28, 2023



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Researchers at the Indian Institute of Technology Madras (IIT-M) have developed a three-dimensional (3D) paper-based portable device that can detect adulteration in milk within 30 seconds. The test could be even performed at home.

It can detect multiple substances commonly used as adulterating agents including Urea, detergents, soap, starch, hydrogen peroxide, sodium-hydrogen-carbonate and salt, among others

Unlike conventional laboratory-based methods to test the purity of milk, which are both expensive and time-consuming, this new technology is affordable and could also be used to test other liquids such as water, fresh juices, and milkshakes for traces of adulteration. Only a millilitre of any liquid would be as a sample to test for adulterants.

Elaborating on the functioning of this paper-based device, Dr Pallab Sinha Mahapatra, Department of Mechanical Engineering, IIT Madras, said, “The 3D paper-based microfluidic device is made up of a top and bottom cover and a sandwich structure middle layer. This 3D design works well for transporting denser liquids at a consistent speed. The paper is treated with reagents and is let to dry. Both paper layers are adhered to both sides of the support after drying, and the covers adhere with double-sided tape. Whatman filter paper grade 4 is used in this design, which aids liquid flow and allows for the storage of more reagents.”

Dr Pallab Sinha Mahapatra added, “All the reagents are dissolved either in distilled water or in ethanol, depending upon their solubility. Using colorimetric detection techniques, all the adulterants are detected in different liquid samples. It is inferred from the investigation that the reagent only reacts with the specific adulterant in this method and not with any milk ingredients. Hence, this analytical tool can help to monitor liquid food safety and thereby increases the traceability of tainted milk in remote areas of developing countries.”

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