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A comprehensive approach for milk adulteration detection using inherent bio-physical properties as 'Universal Markers': Towards a miniaturized adulteration detection platform

Suryasnata Tripathy, Aniket Ramesh Ghole, Khandavalli Deep, Siva Rama Krishna Vanjari, Shiv Govind Singh

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1 **A comprehensive approach for milk adulteration detection using inherent bio-**
2 **physical properties as ‘Universal Markers’: Towards a miniaturized**
3 **adulteration detection platform**

4 Suryasnata Tripathy^a, Aniket Ramesh Ghole^b, Khandavalli Deep^c, Siva Rama Krishna Vanjari^d,
5 Shiv Govind Singh^{*,i}

6 Indian Institute of Technology Hyderabad, Telangana, India-502285

7 ^asuryasnata.tripathy@gmail.com

8 ^bee13m1022@iith.ac.in

9 ^cee14mtech11017@iith.ac.in

10 ^dsvanjari@iith.ac.in

11 ^{*}sgsingh@iith.ac.in

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13 **Abstract:**

14 This paper proposes a novel milk quality detection approach based on utilization of inherent
15 biophysical properties as 'markers' for adulteration. Unlike the traditional adulterant-specific
16 approaches, this method is generic and universal. It exploits the change in innate milk properties,
17 such as electrical conductivity and pH, upon addition of adulterants as a transduction mechanism
18 for detecting milk adulteration. In this work, adulteration with more than 10 commercially
19 known hazardous adulterants is detected by monitoring the changes in milk electrical
20 conductivity and pH. The electrical parameters for pure milk were standardized using AC
21 Impedance-Spectroscopy with glassy carbon working electrode and platinum counter/reference
22 electrode at a potential of 0.3 V and in the frequency range of 1 Hz -1 MHz. The experiments
23 were repeated using gold-electrodes fabricated on glass-substrate as a first step towards

ⁱ Corresponding Author.

Email: sgsingh@iith.ac.in

Telephone: +91-40-2301-6079

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