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Author: Elif Burcu Bahadır, Mustafa Kemal Sezgintürk

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Lateral Flow Assays: Principles, Designs and Labels

Elif Burcu Bahadır[a], Mustafa Kemal Sezgintürk[b]*

[a]Namık Kemal University, Scientific and Technological Research Center, Tekirdağ-TÜRKİYE

[b]Namık Kemal University, Faculty of Science, Chemistry Department, Biochemistry Division, Tekirdağ-TÜRKİYE

***Corresponding Author:**

e-mail: msezginturk@hotmail.com

msezginturk@nku.edu.tr

Tel:+90 282 250 26 05

Highlights

- Lateral flow assays are reviewed in terms of their all aspects.
- Lateral flow assays are low-cost, user friendly, and easy operated.
- More than 220 research papers are compared to their analytical characteristics.

Abstract

Lateral flow assays (LFAs) have attracted interest due to their friendly user formats, short assay times, little interferences, low costs, and being easy by operated by non-specialized personnel. This technique is based on biochemical interaction of antigen-antibody or probe DNA-target DNA hybridization. A lateral flow assay (LFA) is composed of four parts: a sample pad, which is the area on which sample is dropped; conjugate pad, on which labeled tags combined with biorecognition elements; reaction membrane containing test line and control line for target DNA-probe DNA hybridization or antigen-antibody interaction; and absorbent pad, which reserves waste. For the construction of LFAs gold nanoparticles, colored latex beads, carbon nanoparticles, quantum dots, and enzymes are used as a label for increasing the sensitivity. In this work, the principle of LFAs, biorecognition elements, analytical performances, limits of detection (LODs), linear ranges of developed LFAs in different fields are summarized. Future perspectives in this area are also discussed.