

Immobilization of biomolecule on cellulose paper using stable covalent binding

홍우경, 정성근, 이창수†

충남대학교

(rhadum@cnu.ac.kr†)

Paper-based sensors have been widely used in many fields since they are affordable and portable. For reproducibility of analysis, immobilization of biomolecules on cellulose paper is a crucial step in biosensor fabrication. The conventional techniques for biomolecule immobilization on paper-based sensors are based on physical adsorption. However, physically adsorbed biomolecules can be easily removed by weak physical forces. So, the conventional techniques cannot always promise the reproducibility of analysis of the paper-based sensor. To solve this limitation, we show the covalent binding of biomolecules on cellulose paper. This method consists of three steps; Oxidation of paper, the formation of a Schiff base, and reduction of paper. We confirmed the aldehyde and imine groups formed on paper using FT-IR analysis. Through the washing process, we show this covalent binding on paper enhances the binding force between proteins and paper. Lastly, by conducting paper-based sandwich ELISA, we confirm the activity of the antibody immobilized on paper. We expect this simple method of immobilizing biomolecules will contribute to high reproducibility and sensitivity of paper-based sensors.