



Development of urinary albumin and creatinine detection kit

Lalitphan Hongtanee, Luxsana Dubas*, Fuangfa Unob

Department of Chemistry, Faculty of Science, Chulalongkorn University, Phayathai Road, Patumwan, Bangkok 10330, Thailand

*e-mail: Lalitphan.h@gmail.com

Albumin-to-creatinine ratio is the important diagnostic marker for kidney disease. The colorimetric determination of urinary albumin and creatinine was developed in this research. The cellulose acetate membrane (CA) was modified with polyelectrolyte multilayers (PEMs) using the layer-by-layer deposition technique (LbL). Poly(diallyl dimethyl ammonium chloride (PDADMAC) and poly(sodium 4-styrenesulfonate) (PSS) were selected as a suitable polyelectrolyte pair. PEMs film growth on the membrane was characterized using UV-Vis and ATR-FTIR. The modified membrane which PDADMAC is the outermost layer was used to filter bovine serum albumin (BSA) solutions using a syringe pump and the other membrane which PSS is the outermost layer was dipped into creatinine solution. Albumin and creatinine were absorbed onto the modified membranes via electrostatic interaction. Tetrabromophenol blue (TBPB) in Triton X-100 solution was used to analyze albumin by forming blue ion complexes with a λ_{\max} of 625 nm, while Jaffé reaction was used to detect creatinine. The factors influencing the albumin detection including the concentration of TBPB, Triton X-100 and pH of desorption solution have been investigated. The results showed that the optimized albumin detection is achieved using 0.03 mM TBPB in 0.2% (w/v) Triton X-100 and citric-citrate buffer pH 3 as desorption solvent. The color intensity of creatinine complexes provided a linear range for creatinine detection in the range of 0.25 – 1.5 g/L. The modified membranes and analytical method would be useful as a simple and cost-effective detection method for the early diagnosis of kidney failure.

Keywords: Albumin; Creatinine; Tetrabromophenol blue; Jaffé reaction; Polyelectrolyte multilayers (PEMs)