

Development of AC Microelectrophoresis for Rapid Protein Affinity Evaluation

김승진, 신정하, 이지선, 김우식¹, 장상목, 김종민*
동아대학교; ¹경희대학교
(jmkim3@dau.ac.kr*)

We have developed a new method for evaluating the affinity interactions between two different proteins by applying an alternating current (AC) voltage to a micro-flow channel. An AC voltage was applied to the protein-modified microspheres in the micro-flow channel, which resulted in the oscillation of the microspheres owing to their surface charges. The oscillation amplitude showed a linear relationship with the charge density of the microspheres. As an example for protein-affinity measurement, the amplitude changes of a profilin-modified microsphere were measured by the addition of actin. In the same electrical condition, the oscillation amplitude of the profilin-modified microsphere increased by 175% by binding with actin. Similar results in the principle were obtained for the affinity interaction between biotin and streptavidin. The results showed that the higher the charge density of the microspheres induced by binding with different proteins, the higher the oscillation amplitude of the microspheres, thus, suggesting a possible application of the micro-flow channel and AC voltage on the protein property study, as well as on the biosensor application using the oscillation amplitude changes.