Microfluidics in Electrophoresis-On-a-Chip for Complex Biofluids: Effect of Buffer Condition

전명석*
한국과학기술연구원(KIST)
(mschun@kist.re.kr*)

The electrophoresis-on-a-chip technique has been used in μTAS for charge characterization of biomolecules. The main thrust of this research is to assess a framework based on electrokinetic microfluidic principles with attention to rigorous interpretation of experimental data. Instead of Debye-Hückel ansatz, we developed a computational model that would allow the precise analysis of both zeta potential and effective charge by taking advantage of Henry's formula on the basis of nonlinear Poisson-Boltzmann equation. Experimental results of mobility data were obtained for two kinds of model albumin in different pH and double layer thickness of buffer solution and compared with literature data. More accurate value of the effective charge was evaluated from the relationships between potential distribution and surface charge. The discrepancy between linear and nonlinear correlations is trivial at lower zeta potential (< kT/e), however, it fairly increases with increasing the absolute value of zeta potential. Hence, the nonlinear correlation between mobility and zeta potential is necessary for the analysis of biomolecules.