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강연제목: 전기유전영동 핀셋을 이용한 표면전하 의존 다중검출법/
(Surface Charge-Dependent Multiplex Detection Method using Dielectrophoretic Tweezers)

Abstract: Surface charge-based detection is a probing charge displacement from a biophysical interplay between a transducer and target molecule, with many applications in basic and applied biomedical research. Micro/Nanotechnology-based methods have enabled highly sensitive and selective sensing of metal ions and small biomolecules without additional labelling preparation. However, these methods suffer from a complex preparation and measurement signal interference in simultaneous multi-analyte detection, thus difficulty in multiplex detection. Here, we have developed a method to overcome these issues based on the optical discrimination of the dielectrophoretic behaviors of multiple microparticle probes that conjugated to various bioprobe molecules considering the surface charge difference before and after self-assembling conjugation. This technique achieved an attomolar and femtomolar detection limit for mercury ion (II) in distilled water and a drinking water, respectively, using DNA aptamer-conjugated particle probes. In addition to general performance, we demonstrate the utility of this method by simultaneous detection of mercury ion (II) and silver ion (I) using two different DNA aptamer-conjugated particle probes, which achieved tens of femtomolar and a nanomolar detection limit in drinking water.

Brief Biosketch

Dr. Seungyeop Choi is currently a postdoctoral researcher at the department of biomedical engineering at Yonsei University Mirae Campus since 2021. He received his B.S. and Ph.D. from Yonsei University majored in biomedical engineering. During his Ph.D. and postdoc, He focused on the research for dielectric property measurements of artificial and biological microparticles, especially on heavy metal ion detection and breast cancer monitoring. His current research topics include dielectrophoresis applications, small molecule detections, an image processing for microscope image, and a screening method for phenotyping breast cancer cell in cell function level.