DROPBLOT DESIGN INTEGRATES DROPLET MICROFLUIDICS WITH SINGLE-CELL ELECTROPHORESIS

Tech ID: 32979 / UC Case 2023-043-0

PATENT STATUS
Patent Pending

BRIEF DESCRIPTION

Single-cell analyses are revolutionizing biomedicine and biology, with genomics (DNA) and transcriptomics (RNA) tools leading the way. At the protein-level, single-cell analyses are limited to mass spectrometry and immunoassays. Neither assay provides comprehensive coverage of proteome for single cells, missing key protein forms (called isoforms).

UC Berkeley researchers have developed a hybrid droplet-electrophoresis device, termed “DropBlot”, to detect proteins from patient-derived tissue biospecimens relevant to clinical medicine and pathology. The DropBlot takes advantage of water-in-oil (W/O) droplets to encapsulate single cells derived from chemically fixed tissues, thus providing a picoliter-volume reaction chamber in which said cells are lysed and subjected to harsh lysis conditions (100°C, 2 hours), as needed for fixed cells. We report an all-in-one microdevice to facilitate cell-laden droplet loading with >98% microwell occupancy. Droplets remain intact under the electric field and protein isoforms are shown to electromigrate out of the droplet and into a microfluidic separation channel where protein sizing takes place via the action of electrophoresis in a photoactive polyacrylamide (PA) gel. DropBlot has been successfully applied to live and fixed cancer cell lines and resolved proteins with high sensitivity.

SUGGESTED USES

» single-cell protein analysis device

» protein isoform detection

RELATED CASES
2023-043-0

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

▶ Simultaneous Detection Of Protein Isoforms And Nucleic Acids From Low Starting Cell Numbers
▶ Tissue Projection Electrophoretic Separation Of Protein
▶ Automated Two-Dimensional Electrophoresis In Microfluidic Chamber
▶ Microfluidic Chip For Rapid Multi-Analyte Detection
▶ Single-Cell Isoelectric Focusing and pH Gradient Arrays
▶ Protein-Coated Microparticles For Protein Standardization In Single-Cell Assays