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[BioMedical][Engineering] NCKU Landmark Project: Advancement of Enabling Micro/nano-fluidics Technology for Biomedical Applications

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NCKU R&D Express (2011/04/25) An NCKU landmark project led by Professor Gwo-Bin LEE, Department of Engineering Science, reports the first flexible polymer devices for rapid separation and manipulation of micro-particles utilizing the ODEP technique.

Biomedicine and optoelectronics are among the most potential research fields nowadays. In this landmark project, the team demonstrated several new fabrication techniques applications for the optically-induced dielectrophoresis (ODEP) platform, which combine the knowledge from these two fields. It is expected to open up a new era for microfluidic applications. The cost of the biochips using this technology can be relatively low and no complicated lithography and metal patterning process are needed, implying that a disposable system can be feasible. It is envisioned that the developed system can provide a revolutionary platform for biomedical applications and may provide a user-friendly, flexible, and affordable tool for further biotechnology applications.

The optically-induced dielectrophoresis (ODEP) platform fabricated on amorphous silicon substrates or thin-film polymer-based glass substrates has been reported as a promising technique for particle/cell manipulation. The complicated fabrication process of micro-electrodes for generating DEP forces can be simplified by using “virtual” electrodes formed by light illumination. However, amorphous silicon is usually fabricated by plasma-enhanced chemical vapor deposition (PECVD), which is usually expensive and high-temperature process. Alternatively, photoconductive polymers can be spin-coated on ITO glass substrates at a low temperature. It also opens up a possibility to extend its applications on a polymer-based flexible substrate. Accordingly, this study develops a novel flexible polymer device coated with photoconductive polymers fabricated at a low-temperature for rapid separation of micro-particles with the incorporation of gravity effect. The fabrication process is compatible with the roll-to-roll process such that large-area, flexible polymer substrates can be adopted for this application if necessary.

Further Information:
NCKU R&D Express 2011/04/25

National Science Council International Cooperation Sci-Tech Newsbrief
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