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Point-of-care testing technologies for a liquid-based biopsy tool

The liquid biopsy is a method to identify a target cell from the liquid samples. The liquid samples include whole blood, body fluid, and cellular fluid from mucosal surfaces. Point-of-care testing or diagnosis is conducted with these cells included liquid samples extracted from a blood vessel and mucosal surface. For example, HIV progress diagnostic is to count a target cell, CD4+ cell which indicates the immune deficiency and current infection status. Another primary biopsy application in POCT is circulation tumor cell detection which finds out how many target cells flow in the whole blood. Identification and number of the tumor cell in unit volume help to find out the origin of the tumor and progress of cancer. For the cancer diagnosis, cervical cancer can be determined based on the cell which is collected from the cervix, which has the regular or abnormal shape of white blood cells. For these three applications, the cell morphology and counting are critical issues in POCT application. To achieve these aims, we developed a benchtop POCT device based on the in-line holographic microscope as shown in Fig. 1 and 2. The apparatus consists of a simple illumination, cheap CMOS camera, and translational stage to scan the whole area of the slide scan. Based on the simple construction of the platform, a series of the low-resolution image can be abstained and be modified into super-resolution image to detect the cell morphology and the number of target cell.

Biography

SangJun Moon has completed his PhD with a method of microneedle array fabrication using in POCT applications at the department of mechanical engineering from KAIST and Postdoctoral Studies from MIT and Harvard, USA. He has published more than 30 papers in reputed journals and has been serving as an editorial board member of repute. SangJun Moon has also dedicated to research to develop POCT platform to diagnosis HIV, and blood-related disease based on microfluidic platforms. Currently, he has focused on a spectrometer-based cell analysis system to identify cells without using a label on the target cells. Based on the in-line holographic microscopy, the spectrometer-based liquid biopsy tool could be the future of POCT platform of field diagnosis system.

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