

課題番号 : F-20-HK-0007
 利用形態 : 機器利用
 利用課題名(日本語) : 表面弾性波を用いたヤング率に基づく細胞選別技術
 Program Title (English) : Separation of cells according to their Young's modulus using surface acoustic waves
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1. 概要(Summary)

Separating cells with a high throughput according to their mechanical properties can play an important role in the study of cells properties and disease diagnostics. The objective of this research is to design a microfluidic device that can separate cells according to their stiffness using Surface Acoustic Waves (SAW).

2. 実験(Experimental)

【利用した主な装置】

電子ビーム描画装置/ ELS-3700

【実験方法】

The Young's modulus of healthy MDCK cells and MDCK cells chemically treated with Cytochalasin D were measured using a micropipette aspiration technique. Then, the cells were injected in a microchannel placed between two interdigital transducers (IDTs) that generate surface acoustic waves (SAW), as shown in Fig. 1. The design of the microfluidic device was made on AutoCAD then drawn on the Electron-beam lithography system (ELS-3700 Elionix).

3. 結果と考察(Results and Discussion)

The micropipette aspiration technique was performed to measure the Young's Modulus of the cells injected in the inlet. The obtained values are 0.56 ± 0.06 KPa for the Young's modulus of healthy

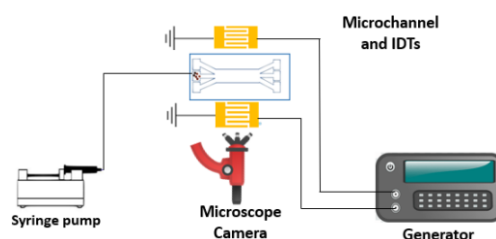


Fig. 1 Experimental setup.

MDCK cells ($n=8$) and 0.23 ± 0.09 KPa ($n=4$) for the Young's modulus of cells treated with Cytochalasin D. In experiments without application of the acoustic waves, we noticed that the trajectory of the particles went to the middle outlet only. After applying the acoustic waves with a frequency of 12.8MHz, the trajectory of the particles was shifted to the left outlet. In summary, this study indicates that acoustofluidics can be a good method for separating biological objects according to their size or mechanical properties.

4. その他・特記事項(Others)

なし。

5. 論文・学会発表(Publication/Presentation)

Chebbi Nour、Toshiro Ohashi、表面弾性波を用いたヤング率による細胞分離、日本機械学会第31回バイオフィロンティア講演会、オンライン開催、2020年12月12日(土)～13日(日)

6. 関連特許(Patent)

なし。