

課題番号 : F-16-AT-0058  
利用形態 : 機器利用  
利用課題名(日本語) : バクテリア培養のためのマイクロ流路デバイスの作製  
Program Title (English) : Microfluidic channel fabrication for applications in microbiology  
利用者名(日本語) : ウタダ アンドリュー  
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### 1. 概要(Summary)

I have utilized the clean room facilities at AIST to fabricate the molds for microfluidic devices. I used the Karl Suss mask aligner to fabricate two-layer molds to culture and observe bacteria growth. After replicating the features in the silicone elastomer polydimethylsiloxane (PDMS), I am able to trap bacteria in chambers of  $\sim O(1 \mu\text{m})$ . We are still gathering data to understand how the bacteria growth in this confined environment.

### 2. 実験(Experimental)

#### 【利用した主な装置】

コンタクトマスクアライナー、スパッタ装置

#### 【実験方法】

I have used the chemical bench, spin coaters, hot plates, Karl Suss mask aligner and the Sputtering deposition system.

### 3. 結果と考察(Results and Discussion)

Bacteria have been shown to be able to be cultured in PDMS devices. These devices are useful due to the flexibility in which new designs can be rapidly prototyped. The time from new design to actual device can be as short as one day (if a “mask” is present). In addition to the speed to prototype new designs, PDMS microfluidic devices enable researchers to impose specific environmental conditions. For example, in the x-y plane, nearly any channel pattern can be designed. These devices typically have a single z-height. However, this limitation can be overcome by using *two* masks that

define the different heights in the device.

Bacteria are typically approximately  $1 \mu\text{m} \times 0.5 \mu\text{m}$  in size. Therefore, to visualize a monolayer of growing bacteria, we must confine them to two dimensions. To do so, I have successfully fabricated two-layer devices capable of trapping bacteria in a thin ( $1\text{-}5 \mu\text{m}$ ), quasi-2D chamber. Bacteria in this chamber grow normally and we are able to accurately monitor their growth and spatial distribution as they divide and spread. We currently are trying to understand intercellular interactions by observing the behavior of the bacteria in these chambers.

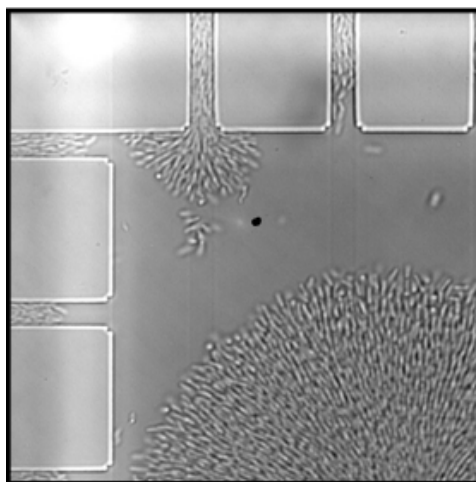


Fig. 1. Bacteria growing in a two-dimensional PDMS chamber.

### 4. その他・特記事項(Others)

なし

### 5. 論文・学会発表(Publication/Presentation)

なし

### 6. 関連特許(Patent)

なし