

Gradient Switching in the M1 Microfluidic Plate

The design of the M1 microfluidic plate allows for the unique function of gradient switching. A stable gradient can be generated within the cell culture chamber. After a specified period of time, this gradient can then be reversed or altered.

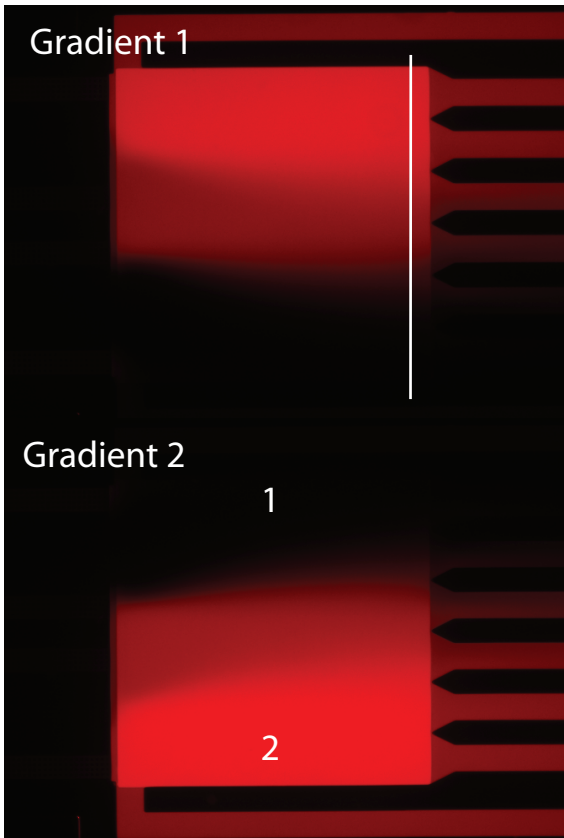


Figure 1: Gradients generated by 2 psi flow pressure in the M1 plate. Intensity data were collected at the positions indicated.

Protocol

- 1 Determining desired gradient profile and duration of each gradient.
Ex: Gradient 1 - (0:50:100) fluorescence, 1 hour
Gradient 2 - (100:50:0) fluorescence, 1 hour
- 2 In a new M1 microfluidic plate, aspirate pre-packaged PBS from each of the wells.
- 3 To generate Gradient 1, pipette 300uL PBS into well B2, 150 uL fluorescent dye and 150 uL of PBS in to well A1, and 300 uL of fluorescent dye into C1. To generate Gradient 2, pipette 300 uL fluorescent dye into well C2, 150 uL of fluorescent dye and 150 uL of PBS into well A2, and 300 uL of PBS into well B1.
- 4 Seal the M1 microfluidic plate to the ONIX manifold, and open the ONIX FG software. Import "M1 Gradient Switching.txt" and click "Test." Verify that the program will take 2 hours by clicking "OK." The pressure of applied to each well should be set to 2 psi. To initiate the program click the "Run" button.

The parameters of this experiment including flow pressure, gradient duration, number of switching cycles, and gradient profile are easily manipulated to suit experiment parameters.

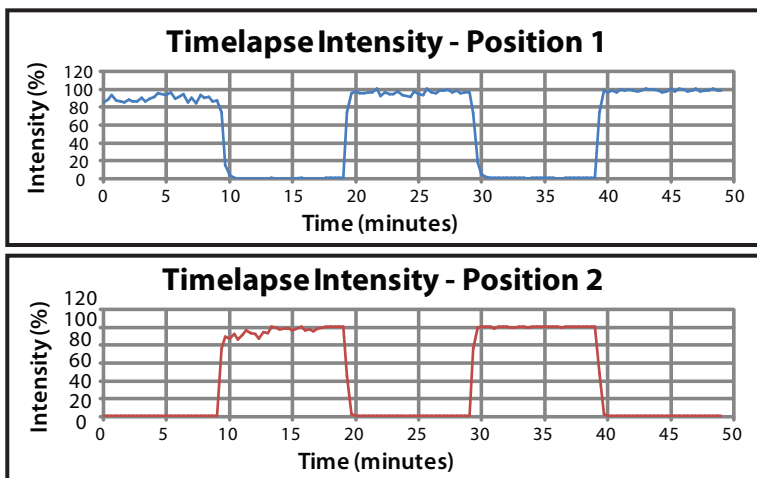


Figure 2: The fluorescent intensity over times at positions 1 and 2 as indicated in figure 1. The gradient was switched every 10 minutes for 50 minutes.

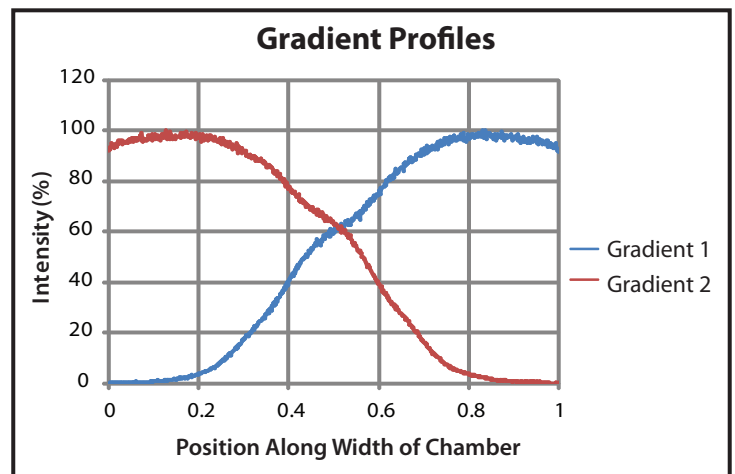


Figure 3: The line intensity profiles of the two gradients generated along the width of the chamber as shown in figure 1.