Introduction
A novel concept in programmable microfluidics using responsive surfaces has been developed. The goal of this study was to realize switchable functionalities in lab-on-a-chip devices using less complex and cost-effective systems. These systems benefit from simple structured coatings inside them which can be controlled to increase the flexibility without adding complex and expensive features. For this purpose, as a proof of the concept, a Switchable Slanted Grooves Micro-mixer (S-SGM) was designed, fabricated and tested. A temperature sensitive hydrogel (PNIPAAm) was used to switch between the mixing and non-mixing states (figure 1).

Design and Fabrication
The hydrogel was polymerized by exposing to UV light. The hydrogel film was also patterned using different dose of the light in different regions and in different steps. For this purpose, the photo-mask in figure 2 was used. In addition, in order to confine the hydrogel in the channel area, PDMS spacers of up to 20 \( \mu \)m was made. Figure 3 shows the fabrication procedure.

Results
We have achieved switching between non-mixing and enhanced mixing in micro-scale. This has been done by confining and patterning a temperature responsive hydrogel in a micro-channel. There is still room for improvement in mixing.

Conclusion
We have achieved switching between non-mixing and enhanced mixing in micro-scale. This has been done by confining and patterning a temperature responsive hydrogel in a micro-channel. There is still room for improvement in mixing.

References