

Supporting Information

Figure S1 shows a schematic diagram of the LOC prepared in this study. The dimension of the LOC is $6 \times 6 \times 1 \text{ cm}^3$. The top-right and bottom-right images show the outer circle group micropillars and the inner circle group micropillars, respectively. The micropillars, particularly in the inner circle group, are situated in a complicated manner. Figure S2 shows the LOC device prepared using microinjection molding. Since COC is used for the LOC, the device appears transparent. The injection molded part has the same two LOC patterns. In addition to the effect of the mold wall temperature on the moldability for micropillars, the effect of the packing pressure on the mold filling quality in microinjection molding was considered (Fig. S3). The packing pressure was not found to affect the processability of micropillars significantly unlike the mold wall temperature, but the effect was not negligible, as shown in Fig. S3. A higher packing pressure yields better mold filling quality. Figure S4 presents cross-sectional SEM images of the micropillars. The pillar edge became sharper with increasing mold wall temperature. This suggests that a sufficient increase in wall temperature is needed to obtain a good replication quality of an injection molded LOC device. Figure S5 shows the equipment used for microinjection molding.

Table 1. Constants for the COC material.

| n | τ^* (KPa) | D_1 (GPa) | D_2 (K) | D_3 (K / Pa) | A_1 | A_2 |
|-------|----------------|--------------------|-----------|----------------|--------|-------|
| 0.428 | 36.632 | 9.46×10^4 | 343.15 | 0 | 42.775 | 51.6 |

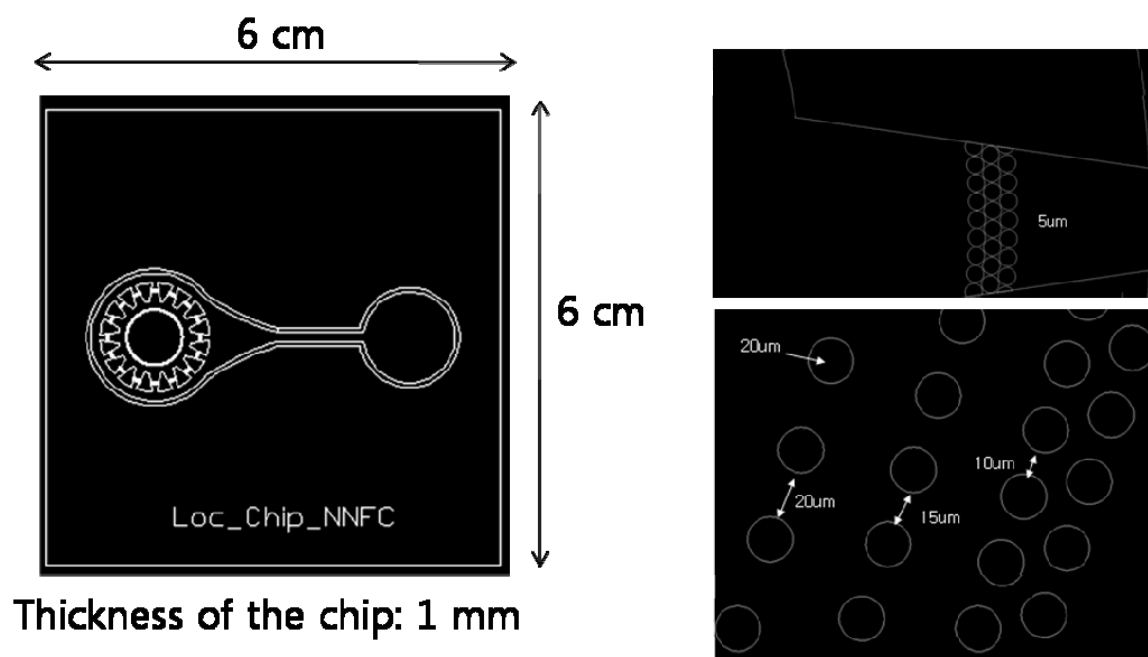


Figure S1. Schematic diagram of microstructured lab-on-a-chip (LOC). The left-hand image shows the entire dimension of the LOC device. The top-right image shows outer circle group micropillars, whereas the bottom-right images display the inner circle group micropillars.

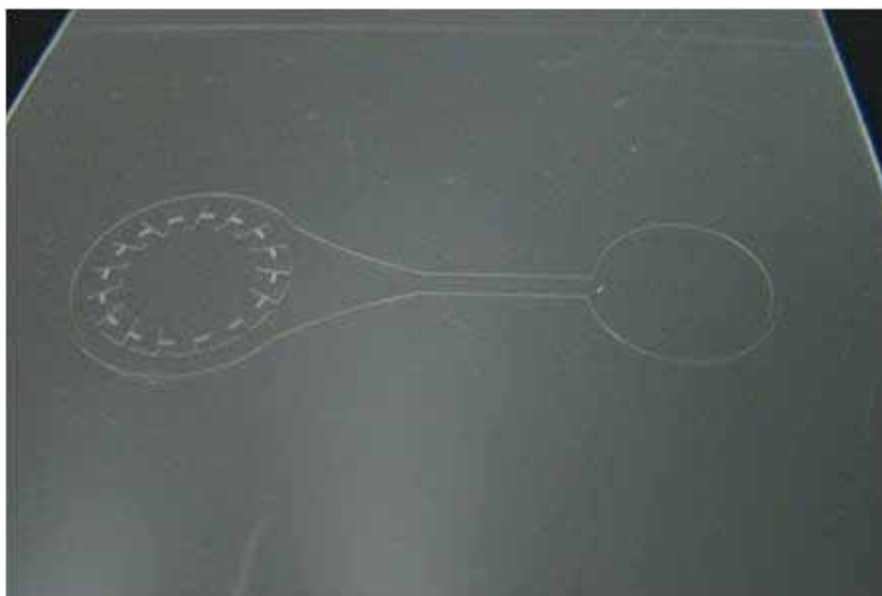


Figure S2. Image of the LOC prepared using microinjection molding. The micropatterns are constructed on the COC device.

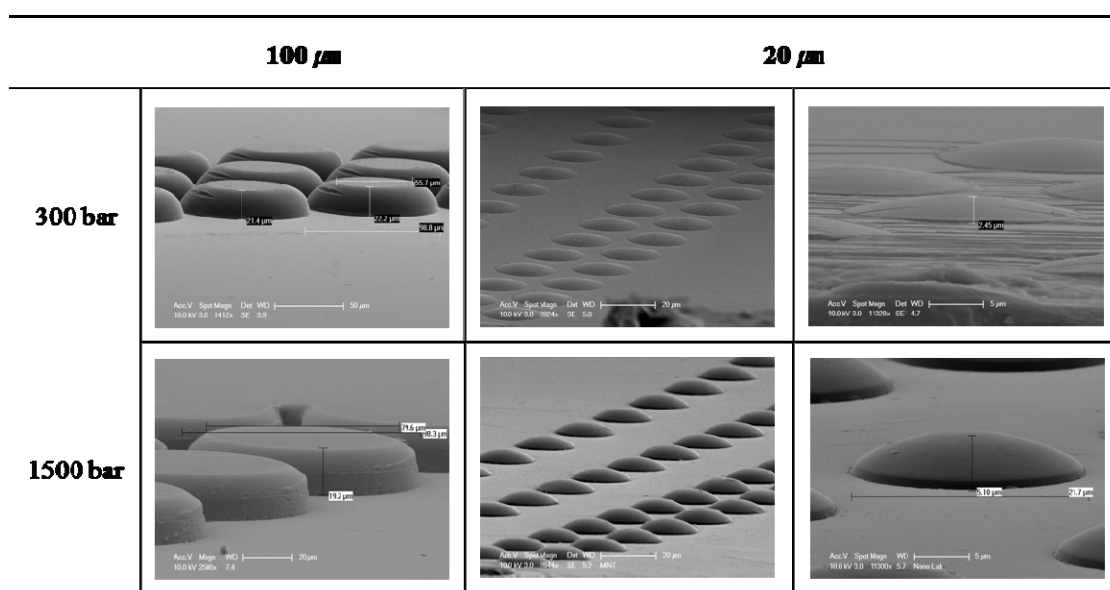


Figure S3. Effect of the packing pressure on the moldability for micropillars in the microinjection molding process. The mold filling quality of 20 μm and 100 μm micropillars were examined by comparing the SEM images of the pillars prepared under different packing pressures, i.e., 300 bar and 1500 bar.

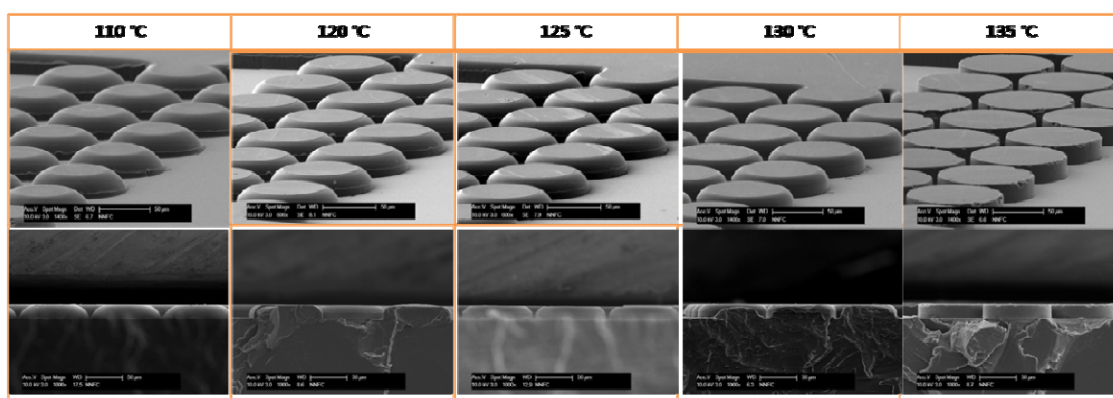


Figure S4. Cross-section SEM images of the micropillars fabricated in this study using microinjection molding. The pillar edge becomes sharper with increasing mold wall temperature, which means good replication quality.

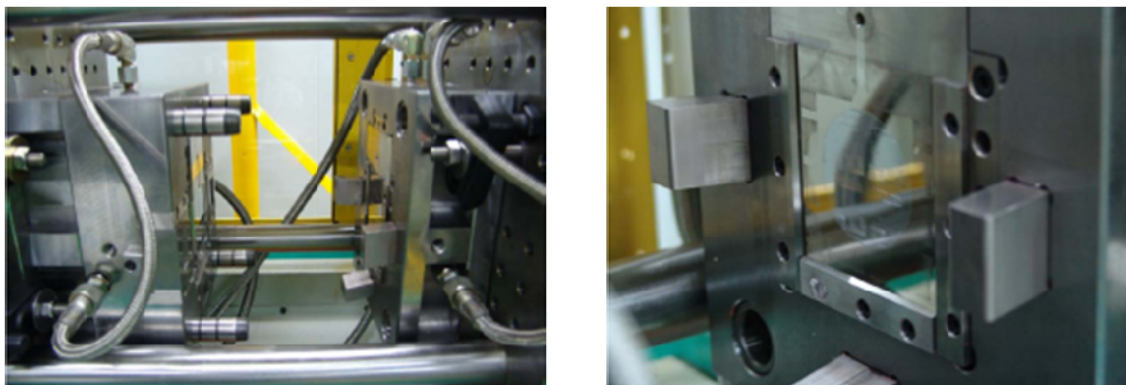


Figure S5. Injection molding machine employed in this study.