Electronic Supplementary Material (ESI) for Lab on a Chip.

Supplementary Information

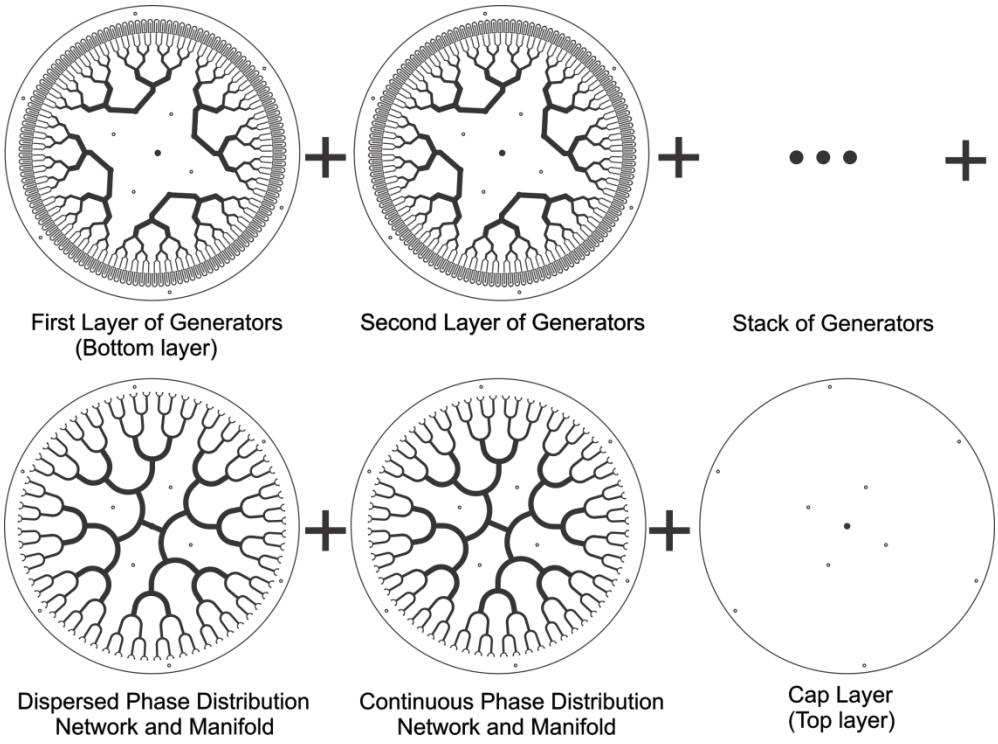

Figure 1 Layouts of the composing layers. The cap layer and both distribution layers are the same for all devices tested in this paper. Devices with one layer of generators operate simultaneously 128 MFDGs arranged in a polar array. To create a device with 256 and 512 MFDG, two and 4 generation layers of 128 MFDGs were stacked.

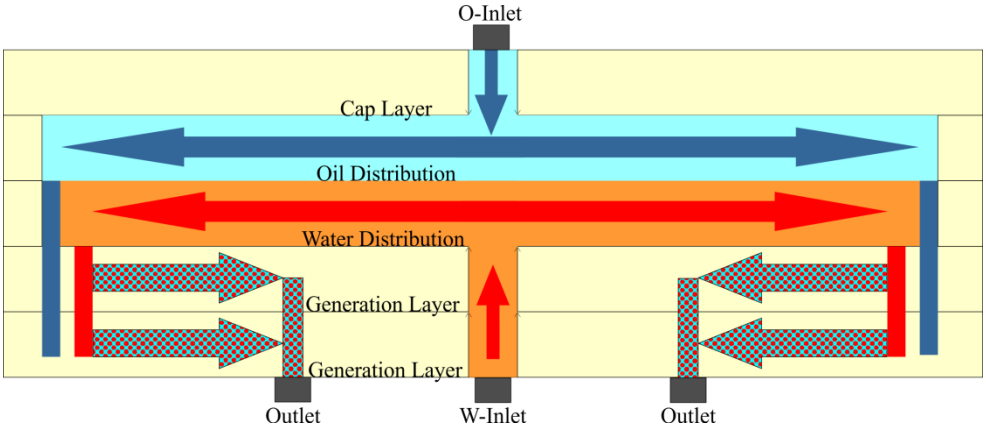

Figure 2 Operation of the axisymmetric distribution network. Both liquids were introduced to the stack of layers from the center of the disk. The flow goes from the center to the edge of the distribution network, and then proceeds to the generation layers. All MFDGs in a layer experience the same pressure drop across the distribution network. One of the advantages of the 3D stacking is the fact that the pressure gradient across the stack of generation layers can be minimized by size of the connecting holes and the thickness of the layers. Thin generation layers reduce the pressure loss and enable high density packing of MFDGs

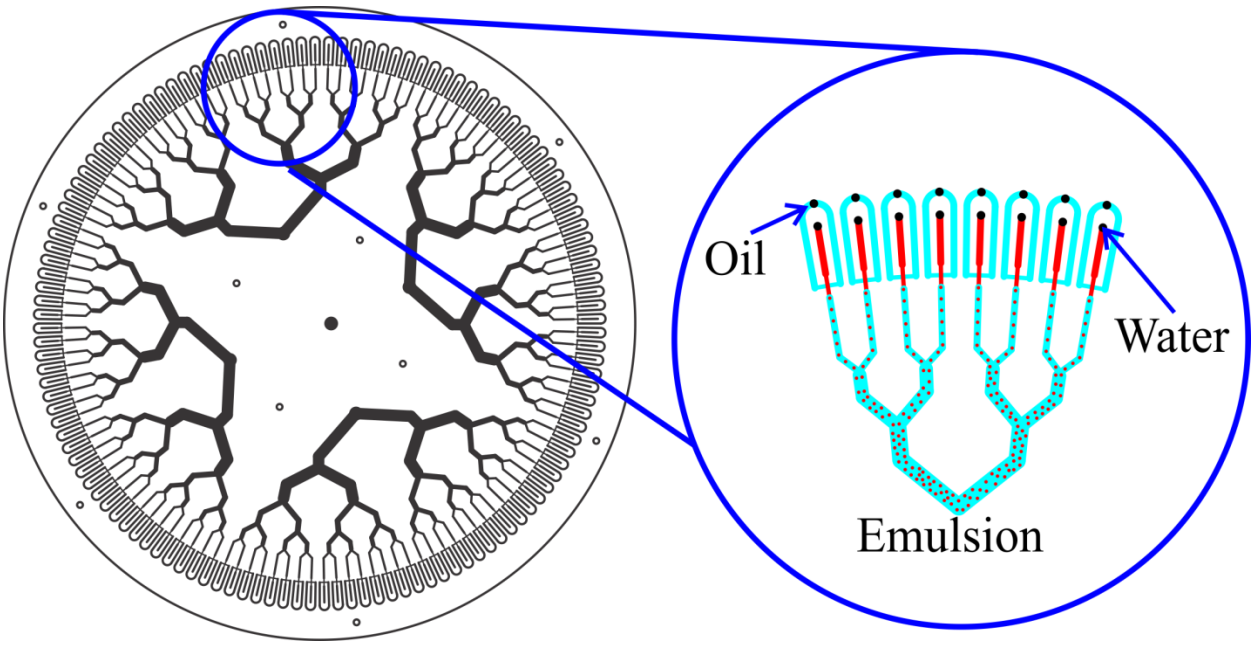

Figure 3 Schematic close up image of the generation layer. The MFDG that was parallelized is a 2D flow-focusing device. All MFDGs are independent in the lowest hierarchical level (i.e. the MFDG junction) in order to reduce the coupling between adjacent devices.