NEGATIVE DIELECTROPHORETIC PARTICLE POSITIONING IN A FLUIDIC FLOW

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ABSTRACT—In this work, we report the control of a microparticle position within fluid flow based on its size by using a repulsive force generated with negative dielectrophoresis (n-DEP). The n-DEP based fluidic channel, which was consisted of navigator and separator electrodes, was used to manipulate the particle flow in the center of channel and to control the particle position in the fluidic flow. The mixture of 10 \(\mu\)m- and 20 \(\mu\)m-diameter particles was introduced into the channel with 30 \(\mu\)m height at 700 \(\mu\)m/s. On applying an AC voltage (23 V peak-peak and 7 MHz) to the navigator electrodes on the upper and lower substrates in a n-DEP frequency region, the suspended microparticles were guided to the center of the fluidic channel and then channelled through the passage gate positioned at the center of the channel. The AC electric field was also applied to separator electrodes, resulting in a formation of flow paths with low electric fields. The separator was consisted of the five band electrodes with the different gap spaces with the adjacent band, which allow to forming the flow paths with different electric fields. The microparticles separately flow in line along the paths formed between the band electrodes, the 10 \(\mu\)m-diameter particles mainly flow through the narrow path and 20 \(\mu\)m-diameter particles through the wide path arranged at the outside from the center. These results indicated that positions of two types of microparticles in the fluidic channel were easily separated and controlled using the n-DEP. The present procedure therefore yields a procedure for the DEP based simple and miniaturized separators.