Phononic Crystal Structures for Acoustically-Driven Microfluidic Manipulations

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SUPPLEMENTARY INFORMATION

Movie M1: Bead centrifugation. 10 μm polystyrene beads were concentrated into the centre of a 10 μl water droplet on the phononic filter (12.5 MHz, 0.8 W). The phononic filter broke the symmetry of the propagating acoustic wave, coming from the bottom of the picture. Its interaction with the droplet resulted in a counter-clockwise angular movement.

Movie M2: Opposite rotation. When the phononic filter was rotated 90° with respect to the propagating wave, the fluid showed a clockwise angular movement, in the opposite direction to the one observed in Movie M1.

Movie M3: Control by the excitation frequency. The same configuration as the one for Movie M1 is used. With a different IDT, the waves were excited at 19.2MHz, outside the band-gap of the phononic lattice. This time, the beads do not concentrate in the centre of the droplet, showing that the phononic structure does not filter the wave at this frequency.

Movie M4: Waveguiding. 10 μm polystyrene beads were concentrated into the centre of a 10 μl water droplet on the phononic waveguide (12.3 MHz, 0.5 W). The phononic lattice reflected the wave, coming from the right-hand side of the picture, around the droplet, creating an assymetry that results in a clockwise angular movement.

Movie M5: Opposite waveguide. When the phononic filter was rotated 90° with respect to the propagating wave, the fluid showed a counter-clockwise angular movement, in the opposite direction to the one observed in Movie M4.