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(54) Title: METHOD AND APPARATUS FOR THE MANIPULATION OF PARTICLES BY MEANS OF DIELECTROPHORESIS

(57) Abstract

The invention relates to an apparatus and a method for establishing closed dielectrophoretic potential cages and precise displacement thereof, suitable for the manipulation of particles and detection of same. The apparatus comprises a first array of selectively addressable electrodes, lying on a substantially planar substrate and facing toward a second array comprising one electrode. The arrays define the upper and lower bounds of a micro-chamber where particles are placed in liquid suspension. By applying in-phase and counter-phase periodic signals to electrodes, one or more independent potential cages are established which cause particles to be attracted to or repelled from cages according to signal frequency and the dielectric characteristics of the particles and suspending medium. By properly applying voltage signal patterns into arrays, cages may trap one or more particles, thus permitting them to levitate steadily and/or move. In the preferred embodiment, where one array is integrated on a semiconductor substrate, displacement of particles can be monitored by embedded sensors to achieve complex operations upon the sample to be analyzed, such as isolation, selection and precise counting of particles.

