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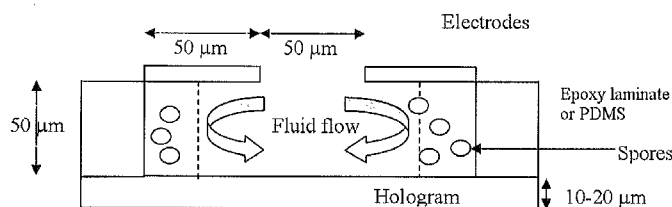


Figure 1a

(57) Abstract: This invention relates to microfluidics apparatus and methods for particle concentration in sensors for sensing biological entities such as cells, spores and the like. We describe a microfluidic sensor for sensing biological particles including a particle concentration device for performing concentration of particles in three dimensions. The sensor device comprises a substrate bearing a microfluidic channel or chamber for carrying a conductive fluid bearing the particles. The channel has: first and second electrodes spaced apart on the channel or chamber for defining an electric field therebetween, and a sensing surface on an inner surface of the channel or chamber. The particle concentration device comprises means for applying an ac voltage across the electrodes to perform simultaneously: i) electrohydrodynamic generation of a convection current flow in the fluid; and ii) 3D concentration of the particles in said fluid by dielectrophoretic attraction or repulsion of the particles towards or away from a region of increased electric field, to increase a concentration of the particles at sensing surface of said sensor.

