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(54) Title: AN APPARATUS AND METHODS TO RAPIDLY DETECT, SEPARATE, PURIFY, AND QUANTIFY VARIOUS VIRUSES FROM CELLS, CULTURED MEDIUM AND OTHER FLUIDS

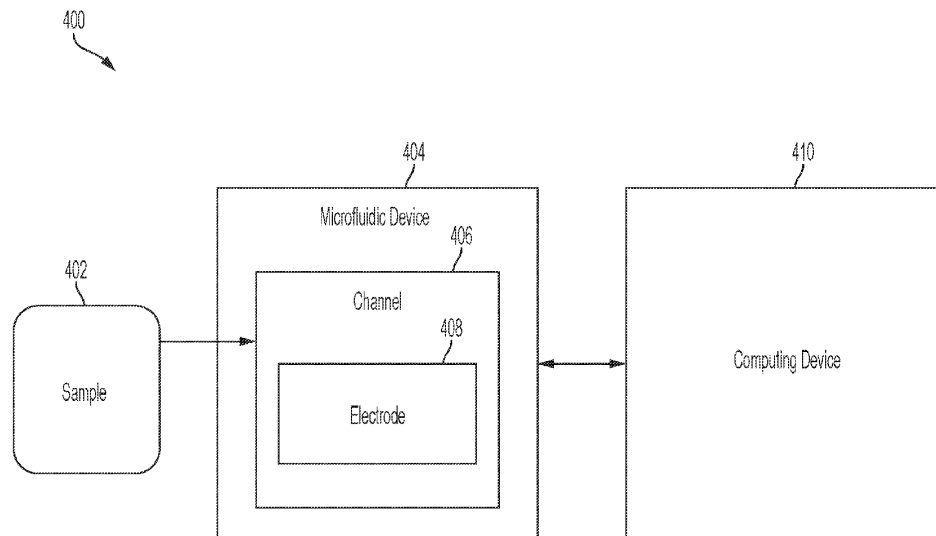


FIG. 4

(57) Abstract: Systems and methods are provided herein for rapid detection, separation, purification, and quantification of viral particles in a sample. According to some embodiments, a microfluidic device is provided for receiving the sample which may contain viral particles. An electrode of the microfluidic device may be used to generate dielectrophoretic (DEP) and/or electroosmotic (EO) forces acting on the sample. The applied DEP and/or EO forces may immobilize components of the sample on the surface of the electrode, may aggregate viral particles of the sample in one region of the microfluidic device, and may separate other components of the sample from the viral particles. The techniques may be performed rapidly, for example, in eight hours or less, and may not affect infectivity of the viral particles. In some embodiments, the sample may be labeled to enhance a response of one or more of the sample components

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