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(54) **APPARATUS AND METHOD FOR
CONCENTRATING AND FILTERING
PARTICLES SUSPENDED IN A FLUID**

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(52) **U.S. Cl.** **204/547**; 204/451; 422/99; 422/100; 422/101; 422/102; 436/180

(58) **Field of Classification Search** None
See application file for complete search history.

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(57) **ABSTRACT**

Disclosed is a device for separating and concentrating particles suspended in a fluid stream by using dielectrophoresis (DEP) to trap and/or deflect those particles as they migrate through a fluid channel. The method uses fluid channels designed to constrain a liquid flowing through it to uniform electrokinetic flow velocities. This behavior is achieved by connecting deep and shallow sections of channels, with the channel depth varying abruptly along an interface. By careful design of abrupt changes in specific permeability at the interface, an abrupt and spatially uniform change in electrokinetic force can be selected. Because these abrupt interfaces also cause a sharp gradient in applied electric fields, a DEP force also can be established along the interface. Depending on the complex conductivity of the suspended particles and the immersion liquid, the DEP force can controllably complement or oppose the local electrokinetic force transporting the fluid through the channel allowing for manipulation of particles suspended in the transporting liquid.

15 Claims, 18 Drawing Sheets

