of claim **1** wherein the sample fluid and said recovery fluid are positioned to form a separation channel, and wherein said at least one node of minimum sound pressure amplitude is positioned off center in said separation channel concentrating the large particles in said recovery fluid.

3. The ultrasonic microfluidic apparatus for separating small particles from large particles contained in a sample fluid of claim **1** wherein said acoustic standing wave generates two or more acoustic nodes of minimum sound pressure amplitude concentrating the large particles in said recovery fluid stream.

4. An ultrasonic microfluidic apparatus for separating small particles from large particles contained in a sample fluid, comprising:

a sample fluid stream containing the small particles and the large particles;

a recovery fluid stream located substantially parallel and adjacent to said sample fluid stream, wherein said recovery fluid stream contacts said sample fluid stream;

an acoustic transducer that produces

an acoustic standing wave, that generates a pressure field having at least one node of minimum sound pressure amplitude; and

an acoustic extension structure located proximate said sample fluid stream and said recovery fluid stream that positions said at least one acoustic node in said recovery fluid stream concentrating the large particles in said recovery fluid stream wherein said acoustic extension structure includes a gel located proximate said sample fluid stream and said recovery fluid stream positioning said at least one acoustic node in said recovery fluid stream concentrating the large particles in said recovery fluid stream.

5. The ultrasonic microfluidic apparatus for separating small particles from large particles contained in a sample fluid of claim **4** wherein said sample fluid stream and said recovery fluid stream are positioned to form a separation channel, and wherein said at least one node of minimum sound pressure amplitude is positioned off center in said separation channel concentrating the large particles in said recovery fluid stream.

6. The ultrasonic microfluidic apparatus for separating small particles from large particles contained in a sample fluid of claim **4** wherein said acoustic standing wave generates two or more acoustic nodes of minimum sound pressure amplitude concentrating the large particles in said recovery fluid stream.

7. An ultrasonic microfluidic method for separating small particles from large particles contained in a sample fluid, comprising the steps of:

providing a sample channel for channeling the sample fluid containing the small particles and the large particles;

routing a recovery fluid channel to flow recovery fluid substantially parallel and adjacent said sample fluid, wherein said recovery fluid contacts the sample fluid thereby creating a separation channel;

locating an acoustic extension structure proximate said separation channel, wherein said step of locating an acoustic extension unit proximate said sample channel and said recovery fluid channel comprises locating a bypass fluid channel containing bypass fluid substantially parallel and adjacent said recovery fluid channel and locating an acoustically transparent wall between said bypass channel and said recovery fluid channel; and

using an acoustic transducer for producing an ultrasound standing wave that generates a pressure field having at least one node of minimum pressure amplitude, said pressure field encompassing said separation channel, and said acoustic extension structure; wherein said acoustic transducer positions at least one acoustic node off center in said separation channel concentrating the large particles in said recovery fluid stream; wherein said step of using an acoustic transducer for producing an acoustic area comprises using an acoustic transducer for producing at least two acoustic nodes that concentrate the large particles in said recovery fluid channel.

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