a particle analyzer located downstream of the one or more flow chamber outlets for characterizing the particles.

Further disclosed herein are methods for controlling an acoustophoretic device that uses an ultrasonic transducer to create a multi-dimensional acoustic standing wave. The method comprises driving an amplifier electrically connected to the at least one ultrasonic transducer to send an output signal to the ultrasonic transducer; measuring a first voltage between the amplifier and a predetermined first impedance; measuring a second voltage between the first impedance and the at least one ultrasonic transducer; measuring a current from the output signal between the measured first and second voltages; determining an impedance of the ultrasonic transducer from the measured current and measured first and second voltages; and adjusting the output signal from the amplifier to obtain a desired impedance of the ultrasonic transducer.

Further disclosed herein are systems for controlling an associated acoustophoretic device. In particular embodiments, the system comprises an amplifier that produces an output signal; a function generator that provides a signal to the amplifier; a power resistor to be electrically connected between the amplifier and the associated acoustophoretic device; and a means for measuring a first voltage before the power resistor and a second voltage after the power resistor.

In certain embodiments, the particles are continuously trapped in the multi-dimensional acoustic standing wave, then agglomerate, aggregate, clump, or coalesce, and eventually settle out of the host fluid due to enhanced gravity forces, and exit the flow chamber. In further embodiments, the multi-dimensional standing wave results in an acoustic radiation force having an axial force component and a lateral force component that are of the same order of magnitude.

The impedance of the at least one ultrasonic transducer can be proportional to the measured current. The impedance of the at least one ultrasonic transducer can additionally be proportional to the first impedance. The impedance of the at least one ultrasonic transducer can be inversely proportional to the measured first and second voltages. The method can further comprise determining the phase angle of the impedance of the at least one ultrasonic transducer. In some embodiments, the first impedance can be predetermined across a power resistor electrically connected between the amplifier and the at least one ultrasonic transducer. In such embodiments, the predetermined first impedance across the power resistor can be