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Battelle Number(s):

12372

Patent(s) Issued

Available for licensing in all fields

Available Technologies

Cylindrically Focused Sonicator for Fluid Treatment or Cell/ Spore Lysis

SUMMARY

Presented here is the development of a novel, continuous-flow, radially focused (cylindrical) ultrasonic device (see figure at right), wherein the sonic zone is radially focused at a distance along the linear flow path throughout the entire length of the transducer. Radially focusing the sonic energy along a flow path is a truly novel sonicator design that enables most of the sonic energy to be applied to and focused on the flow path or fluid channel. Sample residence time in the ultrasonic field is a function of flow rate and transducer length, with no disruption of continuous-flow operation. The cylindrically focused design may be scaled (up or down) to accommodate flow channels of various size (from industrial scale processing to microfabrication processes).

The present invention is an apparatus and method for ultrasonically treating a liquid to generate a product. The apparatus is capable of treating a continuously- or intermittently-flowing liquid along a line segment coincident with the flow path of the liquid. The apparatus has one or more ultrasonic transducers positioned asymmetrically about the line segment. The ultrasonic field encompasses the line segment and the ultrasonic energy may be concentrated along the line segment. The present invention overcomes drawbacks of current ultrasonic treatments beyond cell lysing and opens up new sonochemical and sonophysical processing opportunities.

In cell lysing tests, lysing treatments have been successfully achieved with efficiencies of greater than 99% using ultrasound at MHz frequencies without the typical cavitation and associated problems, and without the need for chemical or mechanical pretreatment, or contrast agents.

Details have been published. Please see: “Continuous Spore Disruption Using Radially Focused, High-Frequency Ultrasound,” D.P. Chandler, et al., Anal. Chem. 2001, 73, 3784-3789.

ADVANTAGES

* Ultrasonically treat a continuously-flowing or an intermittently-flowing liquid to generate a product.
* Maximize the amount of product generated for a given transducer power input.
* Improve the productivity of sonochemical and sonophysical treatments that have traditionally been based on batch processing.
* A rapid, effective, and field-deployable ultrasonic treatment system that requires minimal manual intervention.

U.S. DEPARTMENT OF ENERGY

Patents & Intellectual Property

» Patent #: 7,022,505

Technology Portfolio(s)

» Ultrasonics

» Chemical Processing and Catalysis

» Biotechnology

» Bio-processing

Potential Industry Applications

» Chemicals

» Healthcare, Pharma, Biotech & Medical

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