CLAIMS

1. A system for forming microspheres, the system comprising:

a dispersed phase needle having a proximal first end and a distal second end, the dispersed phase needle including:

a dispersed phase input fitting at the proximal first end,

a dispersed phase output fitting situated between the dispersed phase input fitting and the distal second end, and

a needle tube extending from the dispersed phase output fitting to the distal second end,

wherein the dispersed phase needle comprises a hollow bore throughout its length;

a tee or a wye including:

a plurality of tubes,

a tee input fitting or a wye input fitting,

a continuous phase input fitting, and

a continuous phase output fitting situated between the dispersed phase output fitting and the dispersed phase needle's distal second end,

wherein the tubes each comprise a hollow bore throughout their respective lengths; and

a chamber, the chamber including:

an input tube having an input fitting situated adjacent to the dispersed phase needle's distal second end and comprising a hollow bore throughout its length,

a housing,

an output tube having an output fitting and comprising a hollow bore throughout its length,

a hollow interior, and

an impeller is oriented within the hollow interior,

wherein the impeller includes a plurality of impeller blades and a base, wherein the base includes a magnet to magnetically engage a rotating magnetic field outside of the chamber, and wherein the impeller rotates and creates a direction of natural flow of a fluid through the chamber in a direction from the output tube toward the input tube.

2. The system of claim 1, wherein the dispersed phase needle output fitting engages the tee input fitting to create a seal.

3. The system of claim 1, wherein the continuous phase output fitting engages the chamber input fitting to create a seal.

4. The system of claim 1, wherein a dispersed phase liquid is pumped through the hollow bore of the dispersed phase needle and into the hollow interior of the chamber in a direction opposite the direction of natural flow, and wherein a continuous phase liquid is pumped through the tee or the wye and into the hollow interior of the chamber in a direction opposite the direction of natural flow, and wherein the dispersed phase liquid and the continuous phase liquid are homogenized in a high shear environment created by rotation of the impeller within the hollow interior of the chamber.

5. The system of claim 1, wherein the dispersed phase needle is oriented through the tee or the wye.

6. The system of claim 1, wherein the tee or the wye is formed from three tubes, wherein two of the three tubes are coaxial in arrangement.

7. The system of claim 1, wherein each of the tubes' hollow bore is in fluid communication with each of the other tubes' hollow bore, the dispersed phase needle's hollow bore, the chamber's input tube's hollow bore, and the chamber's output tube's hollow bore.

8. The system of claim 1, further comprising a pump in fluid communication with the dispersed phase needle's input fitting, the pump configured to exert a pressure that is greater than the pressure of the natural flow.

9. The system of claim 1, further comprising a pump in fluid communication with the tee or the wye's continuous phase input fitting, the pump configured to generate a pressure that is greater than the pressure of the natural flow.

10. The system of claim 1, wherein the hollow interior is free of a rotor, a stator, a bushing, and a gasket.

11. The system of claim 1, wherein the needle tube terminates within the input tube.