

## Claims

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1. A mixer for generating particles, comprising a first mixing unit, wherein the first mixing unit comprises a first channel and a second channel, and the first channel comprises a rectilinear channel, and the second channel comprises a curvilinear channel.
2. The mixer according to claim 1, wherein the first channel comprises a first inlet and a first outlet, the second channel comprises a second inlet and a second outlet, the first inlet being in fluid communication with the second inlet, and the first outlet being in fluid communication with the second outlet.
3. The mixer according to claim 1, wherein the mixing unit further comprises a first converging region, the first converging region being in communication with the first inlet of the first channel and the second inlet of the second channel to divert a fluid.
4. The mixer according to claim 3, wherein the mixing unit further comprises a second converging region, the second converging region being in communication with the first outlet of the first channel and the second outlet of the second channel to converge fluids.
5. The mixer according to claim 1, wherein the curvilinear channel of the second channel comprises a semi-circular or arc-shaped channel.
6. The mixer according to claim 1, wherein the second channel further comprises a rectilinear initial channel, the initial channel being disposed in the upstream of the curvilinear channel.
7. The mixer according to claim 6, wherein a length of the initial segment channel is less than or equal to  $1/3$  of a length of the second channel.
8. The mixer according to claim 6, wherein an included angle between the initial channel and the first channel is an acute angle of less than 90 degrees.
9. The mixer according to claim 3, wherein the mixer further comprises a premixing channel, the premixing channel being in communication with the first converging region in configure to mix two different fluids.
10. The mixer according to claim 9, wherein the mixer further comprises a first transporting channel for transporting a first fluid and a second transporting channel for transporting a second fluid, the first and second transporting channels being in fluid communication with the premixing channel.
11. The mixer according to claim 2, wherein the mixer further comprises a second mixing unit comprising a third channel and a fourth channel, wherein the third channel comprises a curvilinear channel and the fourth channel comprises a rectilinear channel.

12. The mixer according to claim 11, wherein the third channel comprises a third inlet and the fourth channel comprises a fourth inlet.
13. The mixer according to claim 12, wherein the inlet of the fourth channel is adjacent to the outlet of the second channel of the first mixing unit, or the inlet of the fourth channel and the outlet of the second channel of the first mixing unit are on the same side of the channel, or the third inlet of the third channel is disposed opposite the outlet of the first channel of the first mixing unit.
14. The mixer according to claim 12, wherein the fourth channel is disposed at an obtuse angle of greater than 90 degrees with the first channel.
15. The mixer according to claim 12, wherein the third channel further comprises a rectilinear initial channel in an upstream side of the curvilinear channel, the initial channel being a partial extension of the first rectilinear channel.
16. The mixer according to claim 12, wherein the mixer comprises a third converging region, a part of a fluid in the third converging region enters into the third channel and a part of the fluid in the third converging region enters into the second channel.
17. The mixer according to claim 1, wherein the mixer further comprises a second mixing unit comprising a third channel and a fourth channel, wherein the third channel comprises a curvilinear channel and the fourth channel comprises a rectilinear channel, the third channel and the first channel are on the same side of the mixing unit, and the fourth channel and the second channel are on the other same side of the mixing unit.
18. The mixer according to claim 1, wherein the mixer further comprises a second mixing unit, wherein the first mixing unit is located upstream side of the second mixing unit, and the second mixing unit comprises a third channel and a fourth channel, wherein the third channel comprises a curvilinear channel and the fourth channel comprises a rectilinear channel; and the fourth channel is taken as a reference, the curvilinear channel of the first mixing unit and the curvilinear channel of the second mixing unit are respectively positioned on either side of the fourth channel.
19. A mixer according to any one of claims 1 to 18, wherein all channels are of the same widths or the same depths.
20. A mixer according to any one of claims 1 to 19, wherein a cross-sections of the channels are rectangular.

21. A mixer for generating a nanoparticle, comprising N mixing units, wherein each of the mixing units comprises a first channel comprising a rectilinear channel, and a second channel comprising a curvilinear channel, the first channel having a first inlet and a first outlet, the second channel having a second inlet and a second outlet, the first inlet and the second inlet being in fluid communication, wherein N is a natural integer from 1 to 6.
22. A mixer for generating a microparticle, comprising a first mixing unit, wherein the first mixing unit comprises a first channel for receiving a first fluid and a second channel for receiving a second fluid, wherein a flow path of the first fluid in the first channel is smaller than a flow path of the second fluid in the second channel.
23. A mixer for generating a microparticle, comprising a first mixing unit, wherein the first mixing unit comprises a first channel for receiving a first fluid and a second channel for receiving a second fluid, wherein a length of the first channel is less than a length of the second channel.
24. A mixer for a nanoparticle, comprising N+1 mixing units, the N<sup>th</sup> mixing unit comprising an a<sup>th</sup> rectilinear channel and an a+1<sup>th</sup> curvilinear channel, the a<sup>th</sup> rectilinear channel comprising an a<sup>th</sup> fluid inlet and an a<sup>th</sup> fluid outlet, the a+1<sup>th</sup> curvilinear channel comprising an a+1<sup>th</sup> flow inlet and an a+1<sup>th</sup> fluid outlet, wherein N is a natural integer equal to or greater than 1, and a is a natural number greater than or equal to 1.
25. The mixer according to claim 24, wherein the fluid inlet of the a<sup>th</sup> rectilinear channel and the fluid inlet of the a+1<sup>th</sup> curvilinear channel comprises an a<sup>th</sup> converging region to divert fluids at the converging region; or, the fluid outlet of the a<sup>th</sup> rectilinear channel and the fluid outlet of the a+1<sup>th</sup> curvilinear channel being in communication with an a+1<sup>th</sup> converging region to mix or converge or merge a fluid from the two channels.
26. The mixer according to claim 24, wherein the N+1<sup>th</sup> mixing unit comprises an a+2<sup>th</sup> rectilinear channel and an a+3<sup>th</sup> curvilinear channel, the a+2<sup>th</sup> rectilinear channel comprises an a+2<sup>th</sup> fluid inlet and an a+2<sup>th</sup> fluid outlet, and the a+3<sup>th</sup> curvilinear channel comprises an a+3<sup>th</sup> fluid inlet and an a+3<sup>th</sup> fluid outlet.
27. The mixer according to claim 26, wherein the a<sup>th</sup> fluid outlet is disposed opposite to the a+3<sup>th</sup> fluid inlet.
28. The mixer according to claim 26, wherein an a+1<sup>th</sup> fluid outlet is disposed adjacent to an a+2<sup>th</sup> fluid inlet or on the same side of a channel.

29. The mixer according to claim 26, wherein an upstream side of the curvilinear channel comprises a rectilinear channel comprising the fluid inlet of the curvilinear channel.
30. The mixer of any one of claims 21-29, wherein the mixer comprises a pre-premixing channel for flowing fluid into the first and second channels, the pre-premixed fluid channel being in the upstream sides of the first and second channels, or in the upstream of the rectilinear channel and the  $a+1^{\text{th}}$  curvilinear channel, where  $a = 1$ .
31. The mixer according to claim 30, wherein the pre-premixing channel comprises a mixed fluid of the first and second fluids.
32. The mixer according to claim 31, wherein the first fluid comprises a nucleic acid and the second fluid comprises a polymer.
33. The mixer according to claim 31, wherein the first fluid comprises a nucleic acid and the second fluid comprises a lipid component.
34. The mixer according to claim 31, wherein the first fluid comprises a microparticle formed from a nucleic acid and a polymer, and the second fluid comprises a lipid component.
35. A method for preparing a microparticle, the method comprising:  
providing the mixer according to any one of claims 1 to 34, passing a fluid from a premixing channel into a first mixing unit, wherein one part of the fluid enters a first channel of the first mixing unit and another part of the fluid enters a second channel of the first mixing unit.
36. The method according to claim 35, wherein a premixed fluid flows in through a first inlet of a first channel in communication with a first converging region and then through a second inlet of a second channel.
37. The method according to claim 30, wherein a fluid passing through the first and second channels of the first mixing unit converges at a second converging region.
38. The method according to claim 37, wherein a fluid from the first converging region enters the third and fourth channels, respectively, through inlets of the third and fourth channels of the second mixing unit in communication with the third converging region.
39. The method according to claim 36, wherein the fluid in the first mixing unit is flowed by externally applying pressure to the channel externally applying pressure to the channel.
40. The method according to claim 37, wherein the first and second fluids are premixed in a premixing channel.

41. A method for preparing a microparticle, the method comprising providing a mixed fluid, passing one part of the fluid through a first channel, and passing a rest part of the fluid through a second channel, wherein a path through which the fluid passes in the first channel is less than a path through which the fluid passes in the second channel.
42. The method according to claim 41, wherein the fluid comprises one or more of a nucleic acid, a polymer, or a lipid component substance.
43. The method according to claim 41, wherein the first channel comprises a rectilinear channel and the second channel comprises a curvilinear channel.
44. The method according to claim 41, wherein a premixing channel is provided in the upstream sides of the first and second channels, a first fluid and a second fluid being mixed into a mixed fluid in the premixing channel.