

16. The device of claim **15**, wherein semicircular microchannels are generated by using swatches of 5×1 pixels that are enlarged with graphic-design software to form lines.

17. The device of claim **15**, wherein complex curved surfaces in the microchannel are created with graphic software operations such as stretching, rotating and skewing.

18. The device of claim **15**, further comprising a second microchannel of a smaller diameter that is semi-circular and includes a semi-spiral ridge inside.

19. The device of claim **15**, wherein the microchannel has a zigzag structure that is modulated in an x, y and z direction.

20. The device of claim **15**, wherein the microchannel has tailored 3D flow patterns inside to accomplish at least one of: promote chaotic advection, create arbitrary cross sections in the microchannel that yield in plane velocity profiles different than Poiseuille flow for pressure driven systems, and modify the cross sectional distribution of an electric field.

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