

485f Fractal Design of Electrokinetic Network

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Three widely used flow patterns, i.e. extensional, mixed-shear and rotational flows are generated by electrokinetic forces in a single fractal design of microfluidic network without surface charge patterning on the channel walls. Unlike other microfluidic devices, the flow patterns in this five-cross design are largely independent of the charge density and polarity of analytes in the fluid. The flow types can be quickly switched by changing the voltage inputs. This microfluidic network can be expanded outwards in the manner of the fractal. The observed flow patterns of buffer solutions containing charged polystyrene (PS) microspheres and lambda-DNA molecules agree very well with simulation results. Also the Brownian dynamics simulation on the conformation change of a single DNA molecule fits quantitatively with the experimental results.