Electrokinetic flows of viscous non-Newtonian fluids in multiple microchannel for energy conversion

이지영[1,2], 전병진[2], 전명석[2,†], 김 효[1]

[1]서울시립대학교; [2]한국과학기술연구원

(mschun@kist.re.kr[†])

We investigate the electrokinetic viscous flows of Carreau model fluids based on electrokinetic microfluidics. The external body force originated from between the Poisson–Boltzmann field and the flow-induced electric field is employed in the Cauchy momentum equation, and then the Nernst–Planck equation in connection with the net current conservation is coupled. Our explicit model allows one to quantify the effects of shear thinning effect and the strong electric double layer interaction. This presentation reports the new results regarding realizing mechanical to electrical energy transfer with high conversion efficiencies. From experimental verifications by using electrokinetic power chip, our theoretical framework can serve as a useful basis for microfluidics design and potential applications to the enhanced energy conversion.