

Experimental investigations on biopolymer in enhancing the liquid flow in microchannel

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ABSTRACT

Drag reduction has been incorporated in various industrial fields. Most of the works proved that drag reduction is efficient in turbulent flow. It is also observed that polymers can enhance the laminar flow which could be a milestone in medical field. In this work, five straight microchannels with fixed depth of 100, 50, and 60 μm in width and 200, 300, 400, and 500 μm in length were designed and fabricated using direct writing method. Xanthan gum as bio-based drag reducing additive was chosen and diluted with deionized water to investigate its feasibility in enhancing the laminar flow in the microchannel. Eight different concentrations of xanthan gum ranging from 20 to 500 ppm were used to evaluate the effect of concentration on drag reduction performance using pressure measurement. The maximum flow increment of 34.90% was achieved by utilizing 500 ppm of xanthan gum at an operating pressure of 100 mbar in the microchannel with a width of 500 μm .

KEYWORDS: biopolymers, drag reducing additives, drag reduction, microchannel

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