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Analysis of Magnetohydrodynamic Flow in Microfluidics YOGENDRA PANTA, WEI LIN, Youngstown State University — Over the last three decades, numerical and experimental fluid dynamic studies have been well documented for optimization of device performance in general fluid dynamics, prediction and analysis of physiological flows, fluid-structure interactions in biological systems, and effectiveness of drug delivery systems in lab on chip devices. Magnetohydrodynamics (MHD) is a proven and a routinely used technology not only in various industries to heat, pump, stir and levitate fluids but also an innovative potential for making remarkable biosensors. Two typical pilot projects to test, analyze and optimize the MHD effects were designed. Microfluidics channels coupled with MHD in various shapes were fabricated from a thin brass sheet sandwiched between two polycarbonate sheets in which two platinum electrodes were patterned on the channel walls. Ionic solution colored with dye was introduced in the channel to visualize the fluid flow with or without the MHD. The induction and driving of fluid motion in the channel was accomplished by placing magnetic field normal to the applied electric field in order to induce Lorentz forces in the fluid contained in the channel. Experimental data and numerical results were obtained in a good agreement. Flow velocities were obtained linearly increasing with the higher magnetic flux densities. Future work will be focused on the development of MHD biosensors for chemical biology applications.

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