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Thermocapillary flow induced by the optical irradiation of carbon nanoparticles J. RODRIGO VELEZ CORDERO, JUAN A. HERNANDEZ CORDERO, Universidad Nacional Autonoma de Mexico — Transport of discrete drops in micro-channels constitutes an essential operation in microfluidic devices. Due to the small characteristic size of micro-channels, the pressure drop necessary to induce motion can be produced by surface tension forces, according to Laplace law, and not only by the use of a mechanical pump. Thermocapillary motion is produced when one extreme of the drop is heated: since surface tension diminishes with temperature, the pressure difference on both extremes will be unbalanced and subsequent equilibrated by the motion of the drop. In this work we used thermocapillary pumping to induce the motion of drops by using a polymeric matrix embedded with carbon nanoparticles (PDMS-Cpart) capable to absorb radiative energy (delivered by an optical fiber) and operate as a heat source. Capillaries with different sizes were then coated with the PDMS-Cpart mixture. The observed motion of the drops, whose velocity is comparable to those achieved using metallic heaters, was analyzed under three important considerations: the dynamic angle hysteresis, optical depth of the PDMS-Cpart layer, and the optical power delivered by the optical fiber.

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