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Investigation of Material Dependence in Electrothermal Vortex

JIAN WEI KHOR, AVANISH MISHRA, Purdue Univ, XUDONG PAN, Harbin Institute of Technology, STEVEN WERELEY, Purdue Univ — Rapid Electrokinetic Patterning (REP) is an optoelectric method which can be used for manipulation of diverse set of particles with laser. However, requirement of high laser intensity remains a stumbling block to proliferation of this method. In this presentation, we demonstrate that careful selection of the electrode material is critical in producing a cost effective REP chip that requires low laser power. The electrodes in REP provide two aspects of the phenomenon; electrical conduction from the electrical power source that produces the electric field and heat absorption from the laser heating that produces the temperature gradient. Consequently, the physical and thermal properties of the electrodes used in REP are crucial for the formation of the electrothermal vortex, which plays a major role in REP as a manipulation technique. Currently, Indium Tin Oxide (ITO) layer is used as the electrodes. ITO produces the electrothermal vortex needed for REP and also provides a viewing window in to the chip. In this study, possibilities of utilizing other materials to produce equivalent or better REP effects than ITO will be investigated.

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