

Abstract Submitted
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Applications of Needle-Like Magnets in Opto-Fluidics¹ ALEXANDER TOKAREV, MEENA MIRDAMADI, MATTHIEU BARDET, SERHIY MALYNYCH, GEORGE CHUMANOV, JOHN BALLATO, KONSTANTIN KORNEV — Imaging in micro and nanofluidics is a challenge: the sizes of micro and nanochannels are so small that the installment of additional optical and mechanical switches is almost impossible. Another constrain is the size of the device and associated increase in viscous dissipation. We suggest manipulating the light by using the existing fiber optics and adding a functional lens which would expand/contract the light on demand. We showed that the shape of the laser beam passing through the colloid with suspended magnetic nanoparticles can be altered by varying the applied magnetic field. When the propagation of light is perpendicular to the magnetic field, this lens filled with a magnetic fluid works as a cylindrical lens focusing the light onto a line instead of onto a point. In the paper we report the experimental results on kinetics of chain formation as observed through dynamic light absorption and multiple scattering. Magnetic nanoneedles are also attractive candidates for making deformable optical lenses. We show that optically transparent solutions of nickel nanowires in ethylene glycol are responsive to weak magnetic fields. When magnetic field is applied from the top, the droplet of this solution changes its shape making a central spike at some critical field. A theoretical analysis and experimental data on this unusual effect will be presented in the paper.

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