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Experimental analysis on viscoelasticity-induced migration of RBCs using digital holographic microscopy[1] TAESIK GO, HYEOKJUN BYEON, SANG JOON LEE, Pohang Univ of Sci Tech — Migration of particles in viscoelastic fluids has recently received large attention, because the generated elastic forces in viscoelastic fluids give rise to a simple focusing pattern over a wide range of flow rates. In this study, the vertical focusing and alignment of rigid spherical particles, normal and hardened RBCs in a viscoelastic fluid were experimentally investigated by employing a digital in-line holographic microscopy (DIHM). By the elastic forces, the three different particles are pushed away from the walls and concentrated in the midplane of the rectangular microchannel. Furthermore, most of both RBCs maintain face-on orientation in the microchannel. The effects of deformability of RBC on the viscoelasticity-induced migration and orientation in the channel were also examined. In contrary to non-deformable particles, normal RBCs are dispersed as flow rate increases. In the region near side wall of the microchannel, normal RBCs have edge-on orientation with a large angle of inclination, compared to hardened RBCs. These findings have a strong potential in the design of microfluidic devices for deformability-based separation of cells in viscoelastic fluid flows and label-free diagnoses of certain hematological diseases.

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