

Laser-induced Brownian motion of emulsion of complex composition droplets

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A motion of monodisperse emulsion droplets of complex composition, in which oil drops contained a suspension of magnetite, has been observed experimentally. Using a microfluidics device [1], monodisperse droplets with a diameter of 65 μm were generated to form a cluster. The droplet system was laser-exposed, and the radiation was absorbed by the magnetite particles inside the droplets. A thermophoretic force as a result of the heating of magnetite particles, the action of which induced intra-drop motion of magnetite inclusions and caused the motion of the emulsion droplets themselves in random direction. The mean square displacement and the linear displacement along and along the normal to the direction of motion were calculated. The probability density distributions of droplet velocities are also obtained. The probability density distribution of droplet velocities, the linear displacement along the normal to the direction of motion and the displacement along the direction of motion are presented. The observed motion of droplets of complex emulsion during laser exposure can be assumed as an active Brownian motion [2]. The research was supported by Russian Science Foundation (project No. 20-12-00372).

[1] Whitesides G 2006 *Nature* 368–373

[2] Bechinger C, Di Leonardo R, Löwen H, Reichhardt C and Volpe G 2016 *Rev. Mod. Phys.* **045006**