

# Mechanism of active Brownian motion in emulsions of complex composition, induced by laser radiation

Kononov E A<sup>1,2,®</sup>, Vasiliev M M<sup>1,2</sup> and Petrov O F<sup>1,2</sup>

<sup>1</sup> Joint Institute for High Temperatures of the Russian Academy of Sciences, Izhorskaya 13 Bldg 2, Moscow 125412, Russia

<sup>2</sup> Moscow Institute of Physics and Technology, Institutskiy Pereulok 9, Dolgoprudny, Moscow Region 141701, Russia

® GADvin@yandex.ru

Active Brownian motion in colloidal systems is an intensively developing topic, which is the subject of a large number of works [1, 2]. The study of active emulsions of complex composition, the mechanisms of their self-organization and the ability to self-locomotion will help to understand the essence of some similar mechanisms in cellular systems (especially the simplest unicellular organisms floating in a liquid).

Brownian motion in colloidal systems, which are quasi-two-dimensional structures made of polydisperse emulsion droplets of a complex composition, under the action of laser radiation has been studied experimentally. The results of the analysis of the trajectories of motion and the root-mean-square displacement of the emulsion droplets are presented. It was found experimentally that the droplet motion is active, including their motion observed in the superdiffusion mode. The mechanism of activity of emulsion droplets as a result of the appearance of motion when the droplets are heated by laser radiation is considered.

The research was supported by the Russian Science Foundation (project No. 20-12-00372).

[1] Martinez I A, Roldan E, Dinis L and Rica R A 2017 *Soft Matter* **13** 22–36

[2] Golestanian R 2009 *Phys. Rev. Lett.* **102** 188305