

## Nanooptics and photonics

### Dynamic light scattering on water droplets with nanoparticles of SiO<sub>2</sub> and Au; preliminary results

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Dynamic light scattering method (DLS) is one of the most popular methods of studying in complex fluids used to determine particle size, size distribution, relaxation processes. The size determination is based on the measurement and analysis of fluctuations of the scattered light intensity in the volume containing particles in a solvent [1-2]. We used the standard setup with photon counting system and Photocor Ltd correlator [3]. As operating wavelength we chose  $\lambda = 405$  nm, because blue laser light gives higher scattering intensity than the more commonly used red laser light. Autocorrelation function (ACF), which is measured experimentally, typically decays exponentially. In such case after processing of the experimental data, the diffusion coefficient can be calculated. We carried out successful tests of experimental equipment for light scattering by Au nanoparticles of 40 nm and 50 nm diameter.

Preliminary results for different concentrations of SiO<sub>2</sub> particles are obtained. For low concentration ACF is inaccurate, however it is easy to observe dynamics of aggregation of particles resulting in changes of aggregate size over time.

We consider measurements of ACF for single small water droplets of suspensions [4] levitating in the electrodynamic trap to be more interesting. First experimental results reveal the possibility of DLS usage for small water droplets with Au, SiO<sub>2</sub> nanoparticles or their mixture.

1. *Chu B.* Laser Light Scattering. Academic Press, N.Y., 1974.
2. *Brown W. ed.* Dynamic Light Scattering: the Method and Some Applications. Clarendon Press, Oxford, 1993.
3. [www.photocor.com](http://www.photocor.com)
4. *Wozniak, M., Derkachov, G., Kolwas, K., Archer, J., Wojciechowski, T., Jakubczyk, D., Kolwas M.* Formation of Highly Ordered Spherical Aggregates from Drying Microdroplets of Colloidal Suspension // *Langmuir* 31.28. 2015. – P. 7860-7868.