Title: Dynamic light scattering in the world of biomolecules

Author: Katarína Križanová

Department: Institute of Physics of Charles University

Supervisor: RNDr. Kateřina Hofbauerová, Ph.D., Institute of Physics of Charles University

Abstract: Dynamic light scattering (DLS) represents a non-destructive method which can determine the hydrodynamic radius of particles in a sample by laser scattering. Consequently, their real sizes can be calculated or, in the case of proteins, molecular masses can be estimated. DLS is nowadays widely used for the study of biomolecules and their reactions, as is documented in the thesis in a brief review. Our experimental work was focused on the measurement of proteins by DLS – lysozyme was used as a model protein. The laboratory protocol for sample preparation and DLS measurement was successfully optimized. In the framework of methodology optimization, the ability of correct detection of small particles was tested using sucrose. We came to the lowest limit of particle dimensions measurable by DLS using sucrose. We were able to observe the linear dependence of the measured hydrodynamic radius on sucrose concentration in the solution and we were also able to determine the hydrodynamic radius of sucrose correctly, in agreement with literature. We practically demonstrated the possibility of dimension determination of particles smaller than 1 nm.

Keywords: DLS, biomolecules, proteins, carbohydrates