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THE EFFECT OF AGAROSE HYDROGEL CONCENTRATION ON DIFFUSION OF BIOMOLECULES

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ABSTRACT

We study diffusion of biomolecules (amino acids) in agarose hydrogel for different agarose gel concentrations ranging from 0.5% to 3%. The structure of agarose hydrogels was earlier found by means of the atomic microscopy method (AFM).

The transport substance can be characterised by a time evolution of the so-called diffusin layer (DL), where the concentration of diffusing substance drops k time. When the thickness of DL, grows in time as t^γ with $\gamma = 0.5$ we deal with normal or gaussian diffusin. If $\gamma > 0.5$ there is a superdiffusion and when $\gamma < 0.5$ we have a subdiffusive behaviour. To observe the time evolution of DL we have employed the interferometric technique: the interference fringes pattern has provided quantitative measurement of the substance concentration $C(x, t)$ at position x and at time t . Recording the interferograms with a given time step, we have constructed the profile of amino acid concentration.

Our results show that the thickness of diffusion layer grows in time t as t^γ , with $\gamma < 0.5$, manifesting a subdiffusive character of the transport proces in hydrogels with concentration of the agarose larger than 0.5%. Analysis of the AFM images indicate that these one are much more pores in the 0.5% gel than in the 3% one. We observe that the diffusion exponent — γ decreases with increasing agarose concentration.

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