APERTURES OF DISCONTINUITY AND LAMELLAR FLOW REGIME OF TEXTURIZED DISPERSE SYSTEMS IN SHEAR RUNNING STREAM

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Apertures of discontinuity and lamellar flow regime of texturized disperse systems in shear running stream.

The stratification effect of disperse (inclusive of nanodisperse) coagulation structures during continuous shear deformation, at different rates, solid-phase dispersions (diameter of particles d 14 nm -10 μm) in a wide range of concentrations in aqueous and non-aqueous dispersion mediums is experimentally found, theoretically proved and described.

Using the method of highspeed freezing of strained dispersions in liquid nitrogen followed by freeze-drying at low temperatures (t = -60 ^{0}C) and analysis of scanning electron micrographs of structure it is demonstrated that with concentration of disperse phase over critical $f>f_c$ the singular aperture of structure discontinuity appears with formation of slide area of dispersion medium between texturized layers persisting at shear rate increasing. With concentration under critical $f<f_c$ a great number of texturized layers forms divided by the liquid dispersion medium ply inserts oriented in shear direction [3,4].

Thereby with increase of continuous shear rate the density and the strength of structures inside solid-state layers, in particular formed by anisometric particles with liophobic-liophilic surface's mosaic structure, increase with demonstration of the inertial particles coagulation effect [3].

To be noticed that with the liophilisation of particles surface the tendency to formation of lamellar structure decreases as well as anisotropy of the dispersion viscosity throughout the shear direction.

The liophilisation of particles surface (SiO_2, calcium and sodium bentonites and etc. in various mediums) with formation of chemisorbed absorbed layers of surface-active compounds as structure-mechanical barrier coupled with the influence of different parameters (frequency and amplitude) orthogonally directed oscillation to continuous shear eliminate «heal» the apertures of discontinuity and liquidate the lamellar flow regime [3,5]. The complete and isotropic structure degradation with achievement of maximum fluidity at the lowest Newtonian viscosity attains with balance of these impacts [1, 3 - 5].

The found out effects are confirmed by the double Doppler ultrasonic scanning method of suspension carrier streams [6] and also by results of computer regulation [7].

Obtained results have found practical applications for various chemical engineering processes in disperse systems and for obtaining of disperse (inclusive of nanodisperse) composite materials.

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