

Rheological properties of polar colloids

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We present results of theoretical study of effects of linear chain-like as well as bulk drop-like heterogeneous aggregates on rheological properties and behavior of ferrofluids. The results demonstrate that appearance of both these internal structures lead to strong, about one-two orders of magnitude, increase of the ferrofluid effective viscosity under the action of the magnetic field applied parallel to the gradient of the ferrofluid flow. When the ferrofluid fills a thin channel (gap) placed into normal magnetic field, the drop-like structures can overlap the channel. In the case of rigid connection between the drop-like domains and the channel walls, the appearance of the elastic and yield stress effects in the ferrofluid is expected.