POLYMER PARTICLE INTERACTIONS IN COLLOIDS and NOVEL RHEOLOGY ADDITIVES FOR CERAMIC PROCESSING

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The rheological properties of suspensions have been attracting the attention of scientist and engineers for use in many important industrial applications. These fluids exhibit complex non-Newtonian flow behavior (either shear thinning or shear thickening) when subjected to external shear forces. Shear thinning of colloidal ceramic particles in aqueous media is important for industrial processing such as frequently used casting, inkjet printing, and spray drying. On the other hand the shear thickening behavior of colloidal suspensions can be advantageous for some other specific applications such as biomedical, sportswear, damping devices, shock absorbers for automotive industry and ballistic protection etc.

We observed that the shear thickening phenomena in low volume fraction, anisotropic and flocculated systems can be mainly attributed to the increase in the effective volume fraction of particles due to both hydrodynamic and physicochemical forces. Based on these finding we design and synthesize new polymeric rheology modifier to control hydrodynamic phenomena on highly loaded suspension and prevent shear thickening for ceramic processing, and we were able to prepare stable suspensions with high solid contents (>40 vol.%)

References

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