
Light Scattering Study on Sol-Gel Transformation of SiO₂ Colloid at Extremely High Concentrations

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Abstract: Ludox SiO₂ sols with a reasonably uniform size of 12 nm and in the high concentration of 10 to 40 wt% were transformed to gels by lowering the pH. The process from sol to gel, followed by light scattering, did not show a sign of fractal growth within the length scale of observation (>40 nm). Rather, a density fluctuation due to a dynamic (non-equilibrium) disorder was apparent. Together with the results of viscosity measurements, it was concluded that the process consists of 3 stages: 1) A dynamic (non-equilibrium) density fluctuation grows rapidly. 2) Such density fluctuation acquires some order. 3) The entire bulk loses fluidity and becomes a macroscopic gel.

Key Words: Light Scattering Study • SiO₂ Colloids • Sol-gel Transformation

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