## Measurement of the Soret coefficient and Thermodiffusion Coefficient in Ternary Polymer Solutions of Cellulose Acetate Butyrate, Styrene, and 2-butanone by a Soret Forced Rayleigh Scattering Method at 298.2 K

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We measured the Soret coefficient and thermodiffusion coefficient in ternary polymer solutions composed of cellulose acetate butyrate (CAB), styrene, and 2-butanone by the optical holographic grating technique which we call the Soret forced Rayleigh scattering technique. Although mass transport phenomena including thermodiffusion play significant roles in many natural systems and engineering processes, experimental data of thermodiffusion on systems of practical interest, including polymer solutions used in engineering, are still very limited. We experimentally examined the thermodiffusion including CAB, which is a generally used polymer for functional films. In the SFRS technique, themodiffusion is induced by the temperature distribution with the interference pattern of a heating laser. Two probing lasers of different wavelengths (403 nm and 639 nm) enter the sample under the Bragg condition and the mass transport is detected by the diffracted beams. The two-wavelength probing enables the evaluation of the mass transport of the two independent components in ternary systems. To obtain two independent Soret coefficients or two independent themodiffusion coefficients in ternary systems, we solve the linear simultaneous equations. The elements of the coefficient matrix in this calculation are the optical contrast factors, which are related to the dependence of the refractive index on the concentration. We measured the optical contrast factors using an Abbe refractometer and found that the condition number of this system is lower than 50. The SFRS measurement has been carried out on several compositions of CAB/styrene/2-butanone with CAB mass fraction of 0.10 at a temperature T = 298.2 K. It was found that the Soret coefficient of CAB is positive in this system, which means CAB is transported to the cold side under a temperature gradient.