Electronic Supplementary Information

Concentration Dependence of Dynamics for Microgel Suspension Investigated by Dynamic Light Scattering

Takuma Kureha,[a] Haruka Minato,[b] Daisuke Suzuki[b,c]

Kenji Urayama,[d] and Mitsuhiro Shibayama[a*]

[a]Institute for Solid State Physics, The University of Tokyo, Kashiwa 277-8581, Japan.
[b]Graduate School of Textile Science & Technology, Shinshu University, Ueda 386-8567, Japan.
[c]Division of Smart Textile, Institute for Fiber Engineering, Interdisciplinary Cluster for Cutting Edge Research, Shinshu University, Ueda 386-8567, Japan
[d]Department of Macromolecular Science and Engineering, Kyoto Institute of Technology, Sakyo-ku, Kyoto 606-8585, Japan.

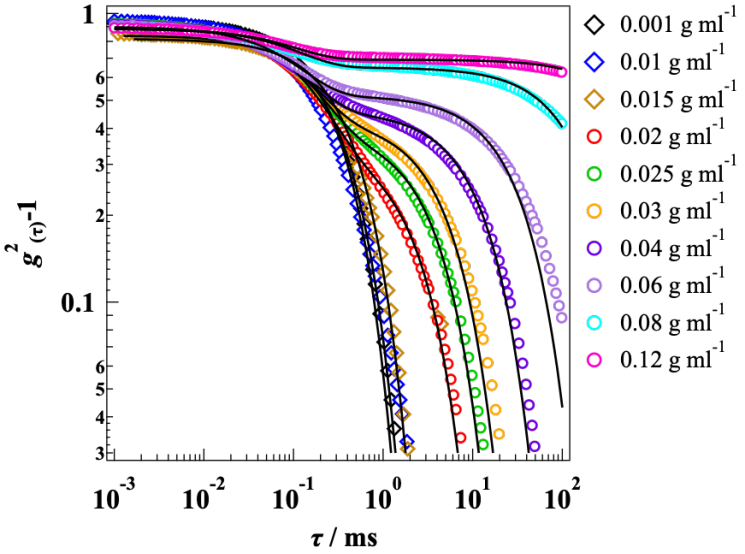

Figure S1. The intensity correlation function, $g_T^{(2)}(\tau) - 1$, of the microgel suspension in the dilute and the intermediate concentration regions. The solid lines are the fitting curves using the single exponential function, Eq.(2), for C = 0.001 and 0.01 g ml^{-1} and the single and stretched exponential functions, Eq.(6), for C = 0.02-0.12 g ml^{-1} as described in the manuscript.

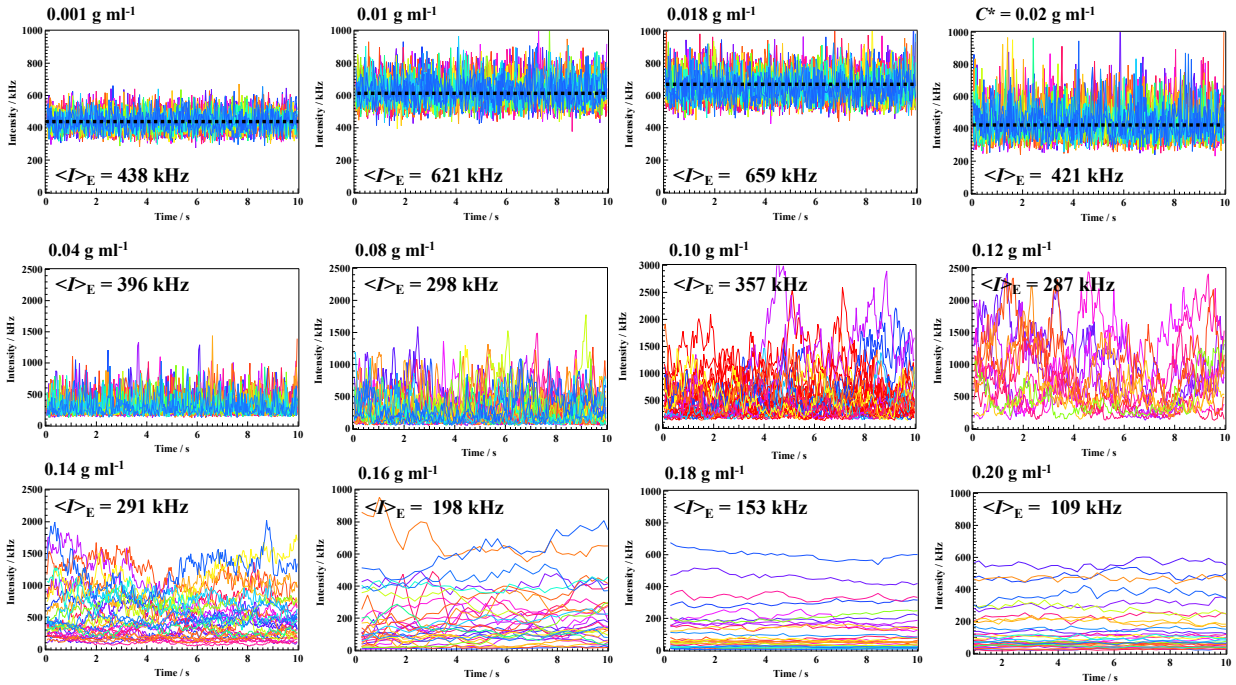

Figure S2. The measurement time dependence of the scattered intensity at 30 different positions. The values of the ensemble-average scattered intensity ($\langle I \rangle_E$) were also shown at each concentration. Note that the displayed data were cut from 600 s to 10 s of measurement time to make the data more visible. The range of scattered intensity on the vertical axis is different for each concentration because of the difference in incident light intensity.

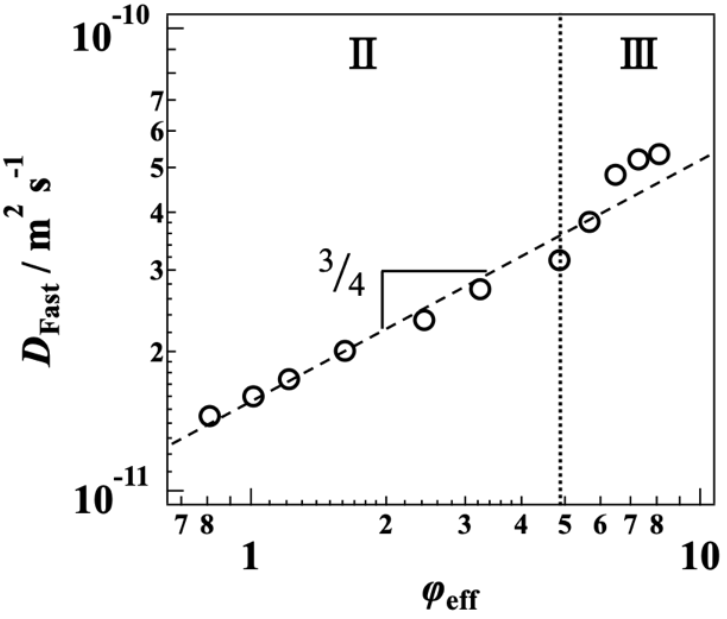

Figure S3. The cooperative diffusion coefficient (D_{Fast}) as a function of the effective volume fraction (φ_{eff}). The values of D_{Fast} are obtained from region II and III.

Table S1. Summary of the results of the SLS measurements.

C	R	R_g	σ_{surf}
g ml^{-1}		nm	
0.01	68	41	31
0.02	73	44	30
0.04	81	49	27

These parameters were obtained by fitting Eq.8. In the regions I (0.01 g ml^{-1}) and II (0.02 and 0.04 g ml^{-1}), the SLS profiles exhibited the loose curves because the spherical shape existed in the suspensions as shown in Figure 7. The obtained parameters were not significantly changed when C was increased from the region I to region II. It suggested that the microgels were diffusive.

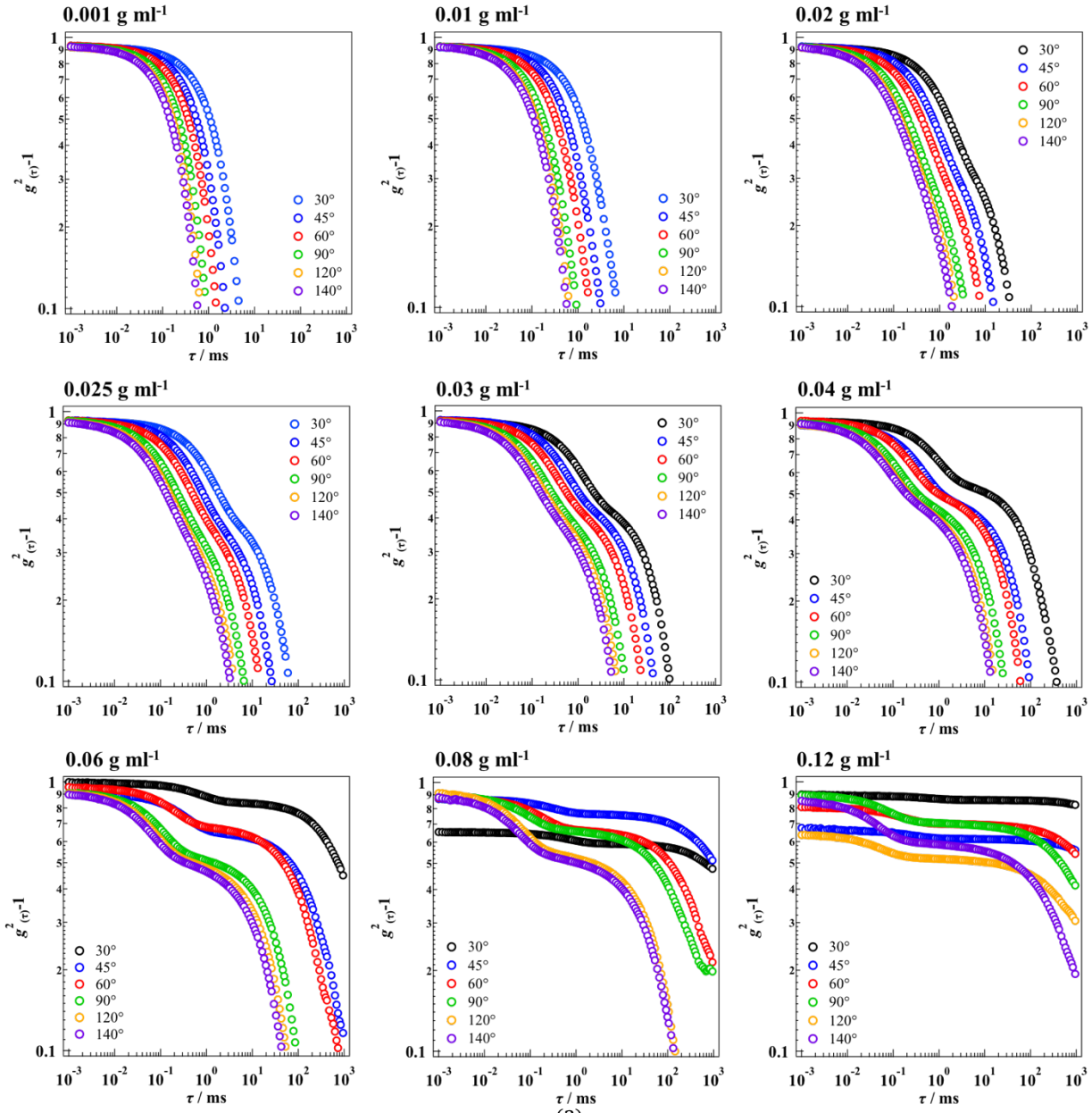

Figure S4. The intensity correlation function, $g_T^{(2)}(\tau) - 1$, of the microgel suspension measured at different scattering angles (θ = 30, 45, 60, 90, 120 and 140°). Each measurement time was 600 s at 25 ± 0.3 °C.

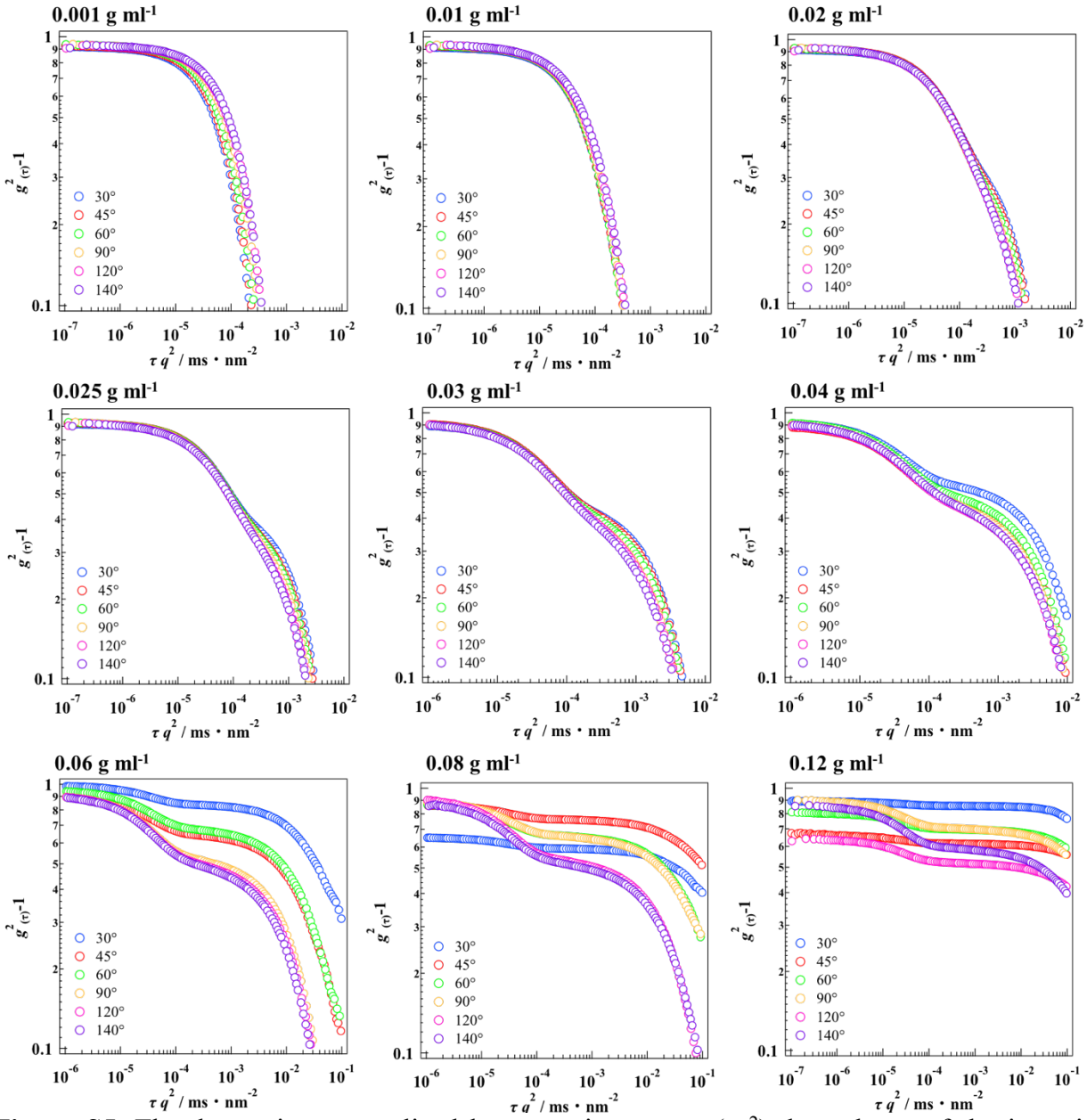

Figure S5. The decay time normalized by scattering vector (τq^2) dependence of the intensity correlation function, $g_T^{(2)}(\tau) - 1$, of the microgel suspension measured at different scattering angles (θ = 30, 45, 60, 90, 120 and 140°).

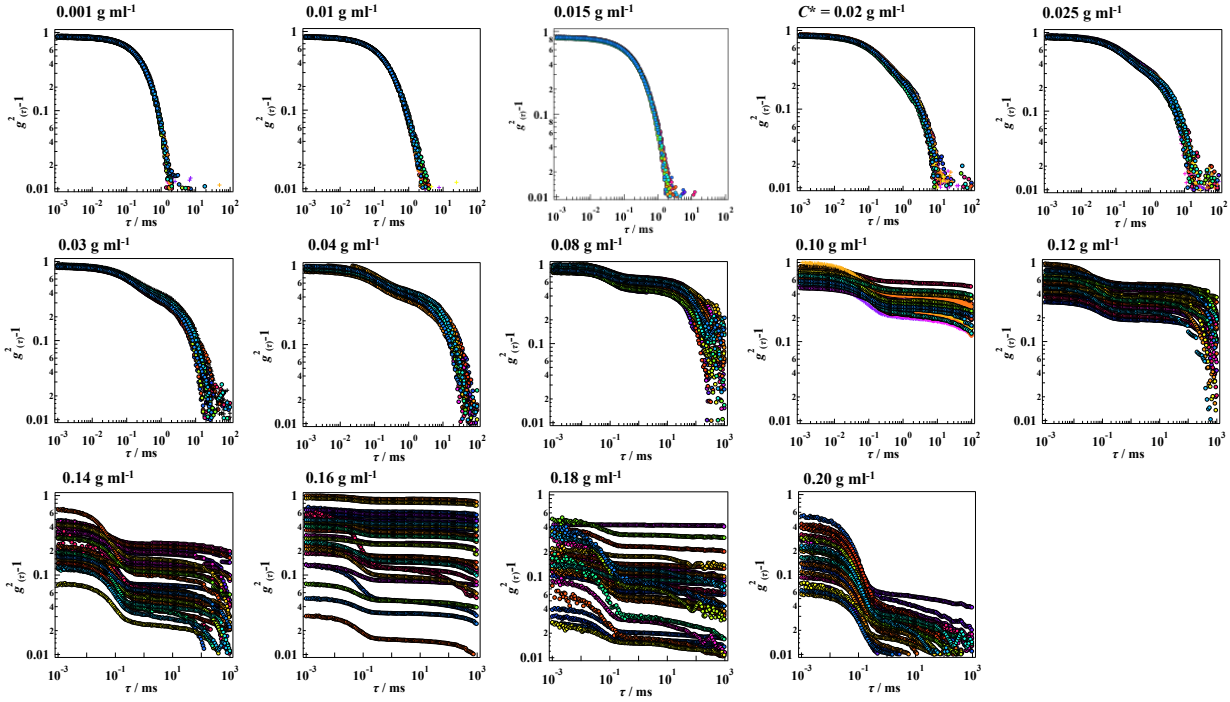

Figure S6. The intensity correlation function, $g_T^{(2)}(\tau) - 1$, of the microgel suspension at 30 different positions.

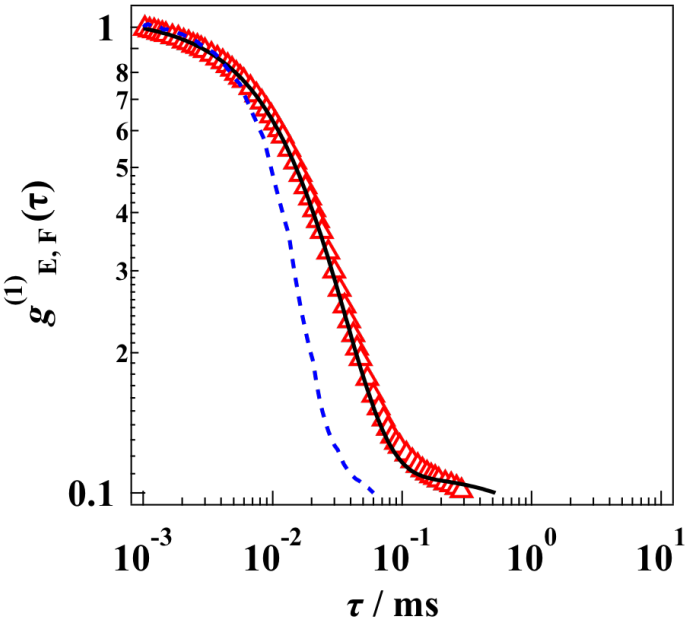

Figure S7. Dynamic component, $g_{E,F}^{(1)}(\tau)$, in the ensemble-average field correlation function, $g_E^{(1)}(\tau)$, at C = 0.20 g ml^{-1}. The black solid and blue dotted lines are the fitting curves using Eq.(12) and Eq.(6), respectively. The best fit was obtained using Eq.(12), which is the double stretched exponential functions.