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Supporting Information

Dynamics of ethyl cellulose nanoparticle self-assembly at the interface of a nematic liquid crystal droplet

Yining Han[a], Navid Bizmark[a], Nasser Mohieddin Abukhdeir[a,b] and Marios A. Ioannidis[a,*]

[*]To whom correspondence should be addressed. Email: mioannid@uwaterloo.ca
[a]Department of Chemical Engineering, University of Waterloo, 200 University Avenue West, Waterloo, Ontario N2L 3G1, Canada
[b]Department of Physics and Astronomy, University of Waterloo, 200 University Avenue West, Waterloo, Ontario N2L 3G1, Canada

Drop-weight (drop-volume) tensiometry

Following the modified Tate's law given by Harkins and Brown,[1] we determined the interfacial tension of 5CB-water from[2]

$$\gamma = \frac{V(\rho_{5CB} - \rho_{water})g}{2\pi r \psi(r/V^{1/3})} \quad \text{(S1)}$$

where V is the volume of the falling drop, r is the internal radius of needle (0.3015 mm), g is the local accelaration of gravity, and ρ_{5CB} and ρ_{water} are the density of 5CB (1028 g L^{-1}) and water (998 g L^{-1}) at the given temperature (22°C), respectively. $\psi(r/V^{1/3})$ is a correction factor[2] to account for deviations from hemisphericity. A drop of 5CB is formed in water and kept growing to a maximum size before it breaks away. Repeating the precedure for 5 times, we obtained a value of 41.5±0.3 mN m^{-1} for the interfacial tension of 5CB-water.

# run	$V \times 10^3$ **(L)**	$r/V^{1/3}$	ψ	γ **(mN m^{-1})**
1	0.268	0.0468	1	41.63
2	0.269	0.0467	1	41.71
3	0.267	0.0468	1	41.48
4	0.265	0.0469	1	41.17
5	0.268	0.0468	1	41.63
			AVE	41.53
			error	0.27

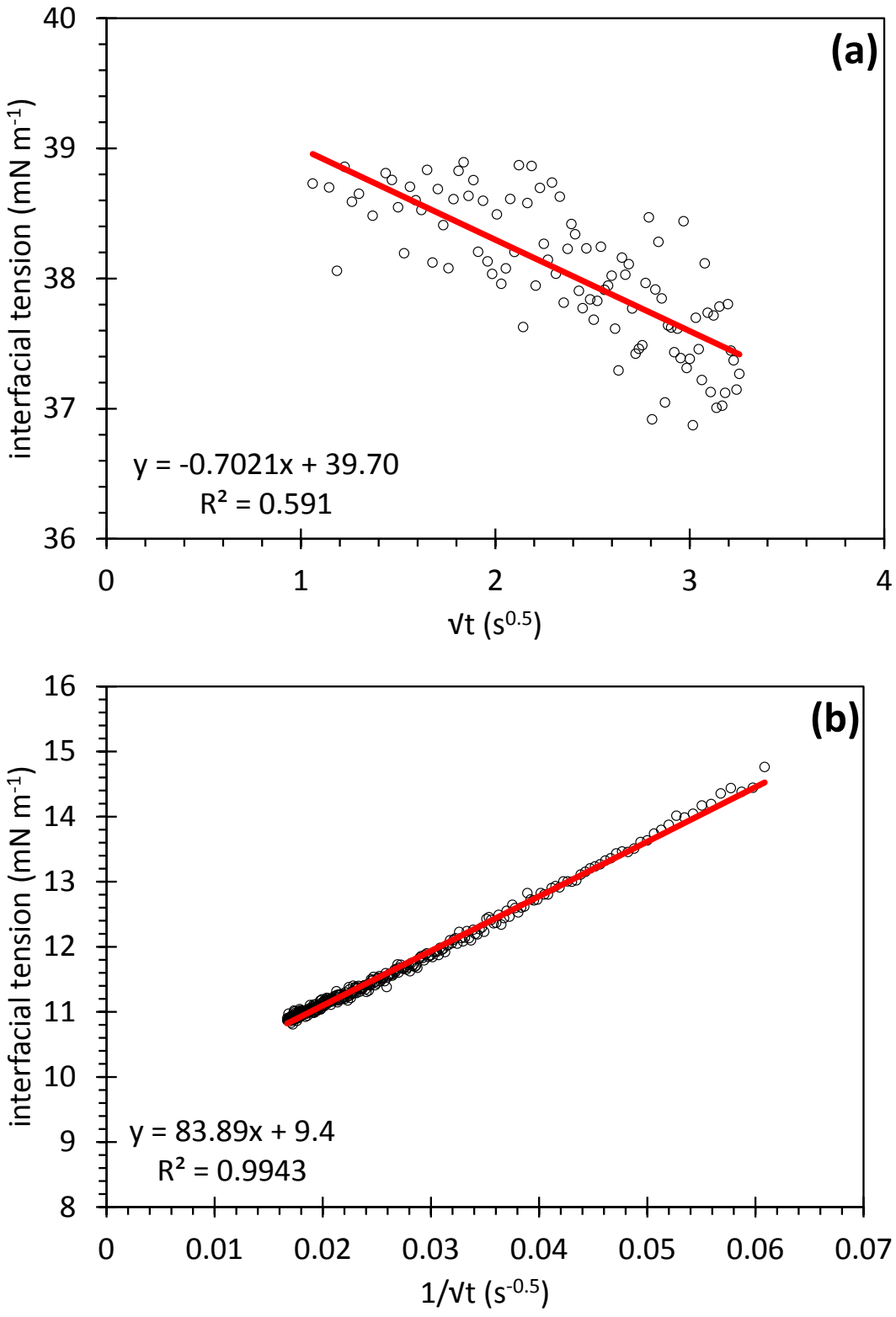


Figure S1. Analysis of (a) early- and (b) late-time dynamic IFT data at a concentration of 0.5 g L^{-1} EC nanoparticles *via* (a) Eq. (3) and (b) Eq. (4).

Table S1. Statistical pair-comparison of 5CB-water IFT determined from early-time dynamic IFT data interpretation (γ_0). It is assumed that each set of measurements has the same variance and the conclusions are based on 95% confidence interpretation.

Case #	EC concentration (g L^{-1})	γ_0 (mN m^{-1})	Standard deviation	Number of measurements
I	0 (pristine 5CB-water interface)	40.6	1.15	4
II	0.3	38.5	1.24	5
III	0.5	39.7	1.27	5

Hypothesis test:

Null hypothesis: No difference between the mean values

Alternative hypothesis: There is a difference between the mean values.

Comparison pair	$t_{obs.}$	$T_{critical}$ (from t-distribution table)	Conclusion
I vs. II	2.48	2.36	$t_{obs.} < T_{critical}$ ➔ Fail to reject the null hypothesis ➔ No difference between γ_0 at different levels of EC concentration is detected.
I vs. III	1.1	2.36	
II vs. III	1.26	2.31	

Table S2. Statistical pair-comparison of adsorption energy ($|\Delta E|$) computed from different approaches and at different EC nanoparticle concentrations. It is assumed that each set of measurements has the same variance and the conclusions are based on 95% confidence interpretation.

Approach	EC concentration (g L^{-1})	
	0.3	**0.5**
Bizmark et al.[3]	**(I)** 5.7±0.3 # runs = 5	**(II)** 5.6±0.9 # runs = 5
Du et al.[4]	**(III)** 5.3±0.2 # runs = 5	**(IV)** 5.2±0.2 # runs = 5
Pieranski[5,6]	**(V)**	5.1±0.3 # runs = 4

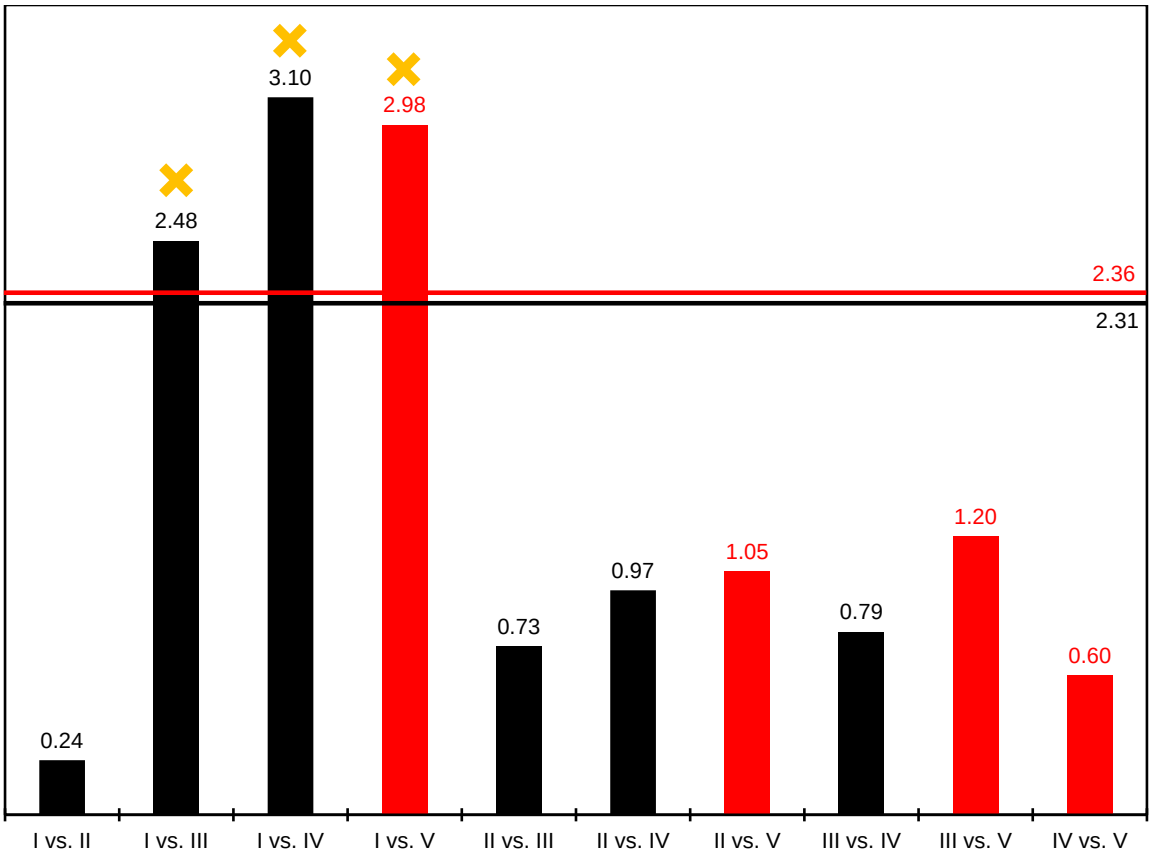
Hypothesis test:

Null hypothesis: No difference between the mean values

Alternative hypothesis: There is a difference between the mean values.

1. $t_{obs.} < T_{critical}$ ➔ Fail to reject the null hypothesis ➔ There is no significant difference between the slopes.
2. $t_{obs.} > T_{critical}$ ➔ Reject the null hypothesis (marked by a ×) ➔ There is a significant difference between the slopes.

All of possible comparisons are shown in the following figure. t_{obs} is calculated from $\frac{|\bar{x}_1 - \bar{x}_2|}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}$, where $\bar{x}$, s, and n are the mean value, standard deviation, and the number of replicates, respectively and subscripts 1 and 2 show two different series. $T_{critical}$ is found from t-table at a 95% confidence level. The black and red bars should be compared to the $T_{critical}$ indicated by the black and red lines, respectively. Only in three comparisons we rejected the null hypothesis (see the following graph).


3.10
2.98
2.48
2.36
2.31
1.20
1.05
0.97
0.79
0.73
0.60
0.24
I vs. II
I vs. III
I vs. IV
I vs. V
II vs. III
II vs. IV
II vs. V
III vs. IV
III vs. V
IV vs. V

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