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Abstract

The experimental setup is shown in Figure 1. The test cell consists of a cylindrical chamber (CAH) with a diameter of 4 cm and a length of 30 cm. The chamber is filled with a porous medium (PTFE) and is connected to a flow system. The flow system includes a reservoir (R), a pump (P), and a flowmeter (FM). The flow rate is controlled by a valve (V). The pressure drop across the chamber is measured by a pressure transducer (PT). The temperature of the fluid is measured by a thermocouple (TC). The chamber is surrounded by an insulation layer (I) to minimize heat losses. The flow is driven by a constant head (CH) of 10 cm. The flow rate is measured by a flowmeter (FM) with a resolution of 0.1 L/min. The pressure drop is measured by a pressure transducer (PT) with a resolution of 0.1 kPa. The temperature is measured by a thermocouple (TC) with a resolution of 0.1 °C. The chamber is filled with a porous medium (PTFE) with a porosity of 0.4. The flow is driven by a constant head (CH) of 10 cm. The flow rate is measured by a flowmeter (FM) with a resolution of 0.1 L/min. The pressure drop is measured by a pressure transducer (PT) with a resolution of 0.1 kPa. The temperature is measured by a thermocouple (TC) with a resolution of 0.1 °C.

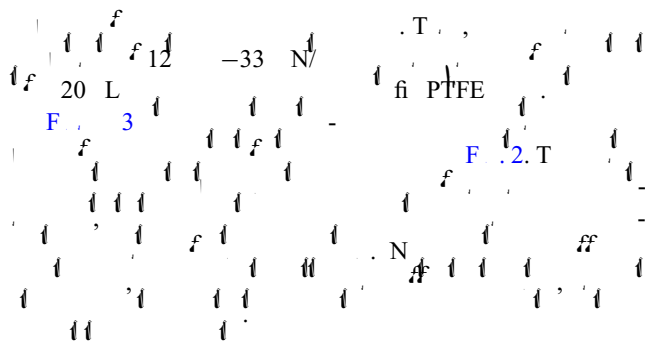
Experimental setup

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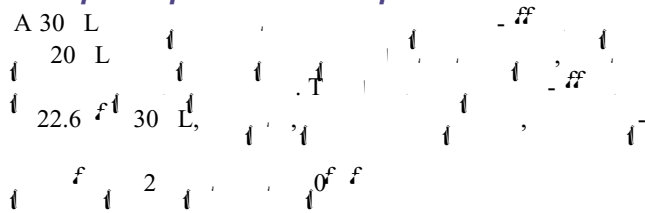
$$T \left(\frac{1}{f} \right) < (\gamma_{SL} \kappa), \quad E_{\text{th}} \quad (9)$$

$(S_L) = 5 \text{ N/}$, $(S_L) = -80 \text{ N/}$, $(S_L) = 50 \text{ N/}$, $(S_L) = -10 \text{ N/}$. T
 F. 2() F. 2() F. 2() F. 2()
 F. 2() B

$(S_L) = 49.2 \text{ E}$



A 30 μL droplet on a tilted plate



$(10 \text{ N/}, -14 \text{ N/}), (3 \text{ N/}, -80 \text{ N/}), (50 \text{ N/}, -5 \text{ N/})$. A ... $(14 \text{ N/}, -10 \text{ N/})$

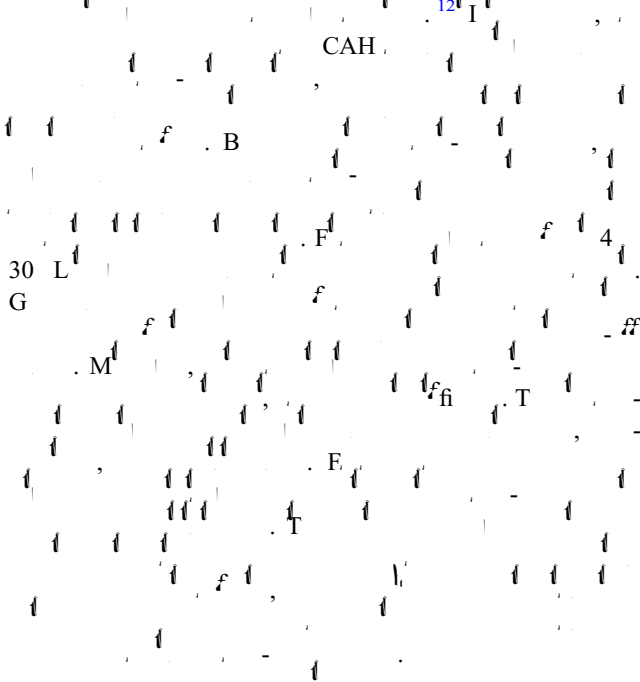
Equilibrium, advancing and receding contact angles

T ... S ... F ... S8. E ...
 30 L ... 16.7, 29.3, 32.3, ... 21.7, ...
 O ... 20 L ... I ...
 E ...
 S ... 8 ... S ... M ... O ...

Discussions on pseudo-line tensions

Concluding remarks

AN-S-



Supplementar material

T
// [10.1557/2019.92](#)

Acknowledgments

T
G (REG) A LU^f T
M (CAPM) L U A P
A T A C (TACC) UT
E C I C (#G-819854).
D.H. - C. M.P. L
D M.C LU^f HPC IT I
M.C S HPC

References

1. H.B. Ea, D.J.C.M. Ma, and J.M. Oh: C ac a h ; ; ; a da ; a a d a ca . *Colloid Polym. Sci* **291**, 247 (2013).

2. R. D , M. Ha , V. Th , R. B h ; b, a d V. S ; ; C ac a h ; ; ; a ; - h b c ac ; . *Soft Matter* **7**, 9380 (2011).

3. L.C. Ga a d T.J. McCa h : C ac a h ; ; ; a d. *Langmuir* **22**, 6234 (2006).

4. J.W. Gbb , H.A. B ; ad, a d R.G. Va Na ; : *The Scientific Papers of J. Willard Gibbs* (L a , G ; ; a d C a , N ; - Y a d B ba , 1906), . 288.

5. L. B a a d A.W. N ; a : G ; ; a a h ; ca ca h ; ca a . *J. Chem. Phys.* **66**, 5464 (1977).

6. N.L. G ; h ; d a d R.J. G d : L ; ; a d h ; ; ; a ac ; ba ; b a d . *J. Theor. Biol.* **17**, 246 (1967).

7. R.J. G d a d M.N. K : Th ; ; c d ; ; c ac a . *J. Colloid Interface Sci.* **71**, 283 (1979).

8. J. D ; c h a d J.D. M ; ; Th ; ; c ac ; h ; ; ; ; d - ; ; a d h ; fl a fi ; a c ; . *Colloids Surf.* **69**, 35 (1992).

9. J. D ; c h a d J.D. M ; ; Th ; ; / ; d - ; ; h ; ; - h a ; - ; . *Particul. Sci. Technol.* **10**, 1 (1992).