Supporting Information

Water-wettable polypropylene fibers by facile surface treatment based on soy proteins

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Johannsmann model to calculate the adsorbed mass

In the Johannsmann model, the shift in QCM frequency (Δf) is related to the complex shear compliance of the thin film ($\hat{J}(\omega)$) by Eq. 1:[1]

$$\Delta\hat{f} \approx f_o \frac{1}{\pi Z_q}(\omega\rho d + \hat{J}(\omega)\frac{\omega^3\rho^2 d^3}{3} \quad (1)$$

where $Z_q = \sqrt{\rho_q \mu_q} = 8.8 * 10^{-6} kg * m^{-2} s^{-1}$ is the bulk acoustic impedance of crystalline AT-cut quartz, $\omega = 2\pi f$ and f is the resonance frequency of the crystal; ρ is the density of the fluid; ρ_q is the specific density of the quartz, μ_q is the elastic shear modulus of quartz and d is the thickness of the film.

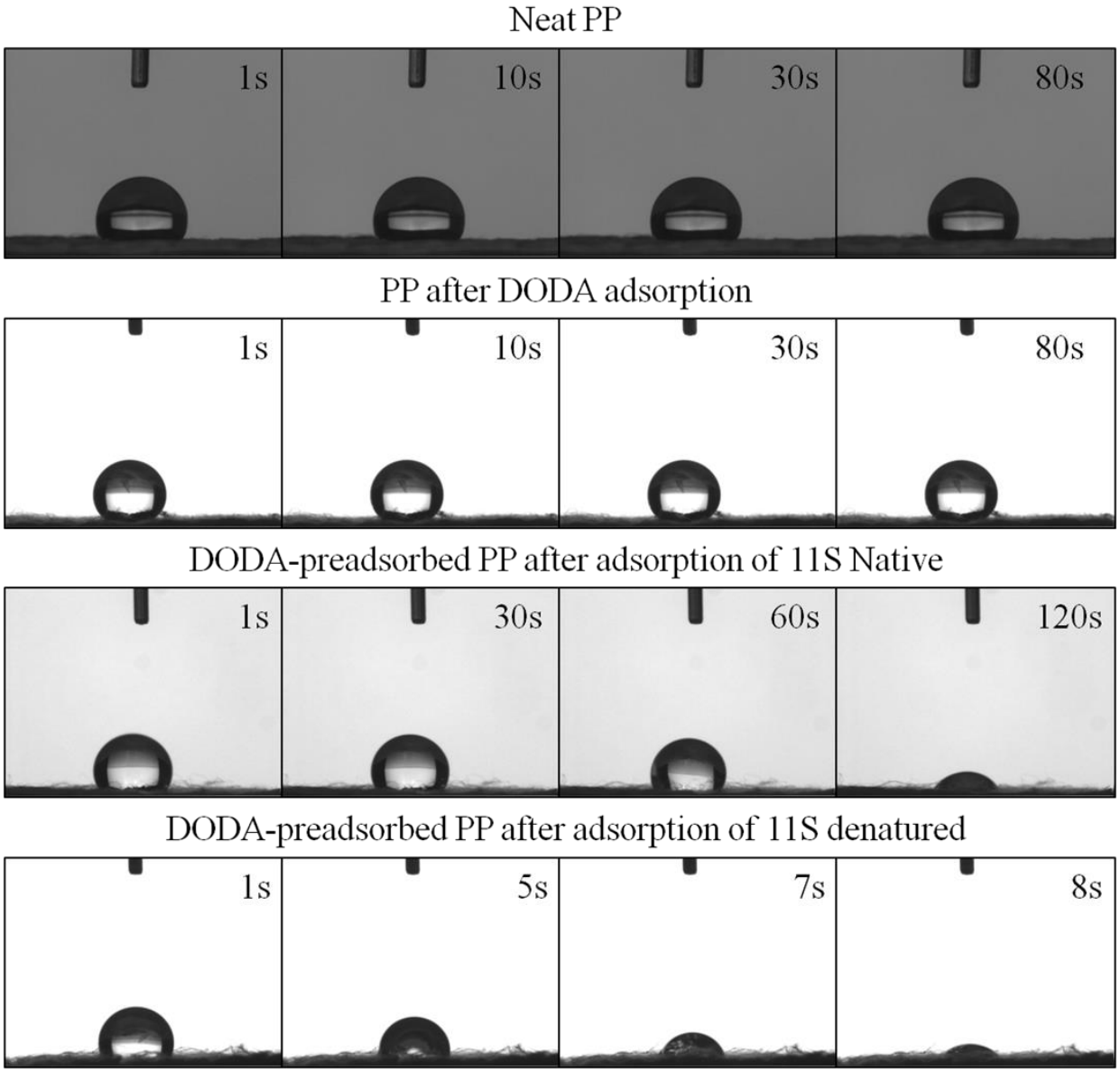
Equation **A** can be rearranged by using the equivalent mass m^* (Eq. 2), which can be used to calculate the true adsorbed mass under the assumption that $\hat{J}(\omega)$ is independent of ω^2 resulting in equation 3:

$$m^* = -\frac{Z_q}{2f_o}\frac{\Delta_f}{f} \tag{2}$$

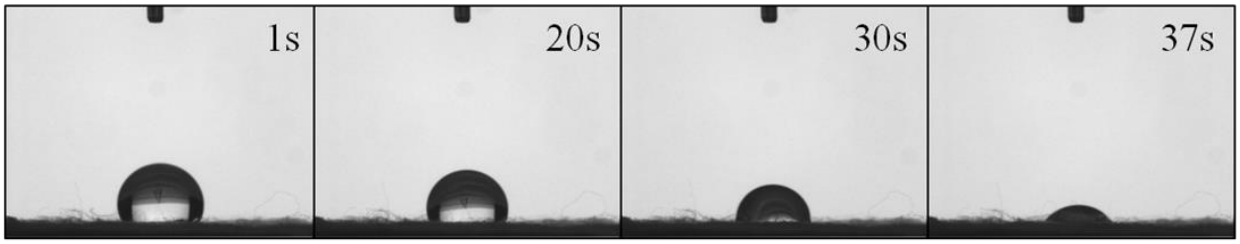
$$m^* = m^o\left(1 + \hat{J}(\omega)\frac{\omega^2\rho d^2}{3}\right) \Rightarrow m^* = m^o\left(1 + \hat{J}(\omega)\frac{f^2\rho d^2}{3}\right) \tag{3}$$

From equation 3 the true mass can be calculated from a plot of m* againts f^2 to give m^o as the intercept.

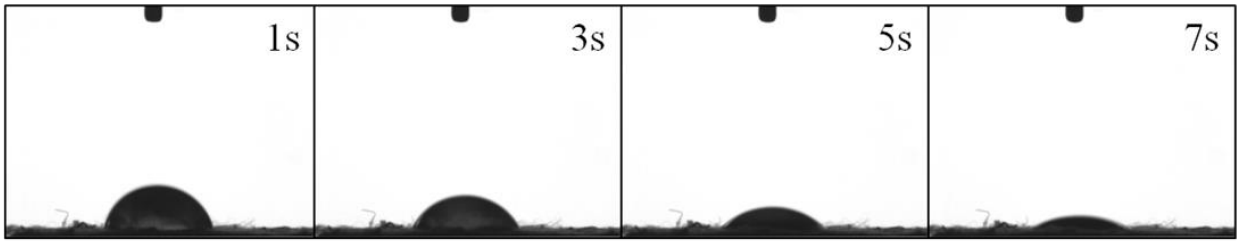
Contact angle images of nonwoven surfaces



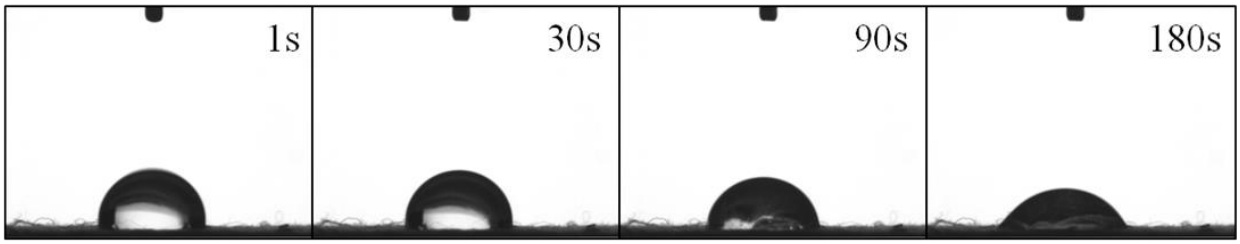
DODA-preadsorbed PP after adsorption of 7S Native



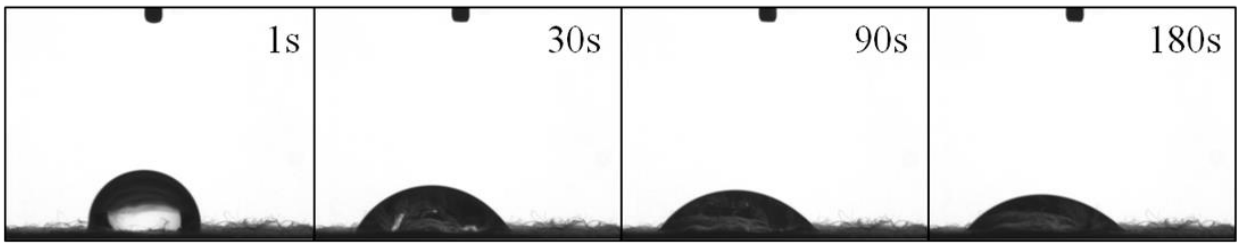
DODA-preadsorbed PP after adsorption of 7S Denatured



DODA-preadsorbed PP after adsorption of Isolate Native



DODA-preadsorbed PP after adsorption of Isolate Denatured



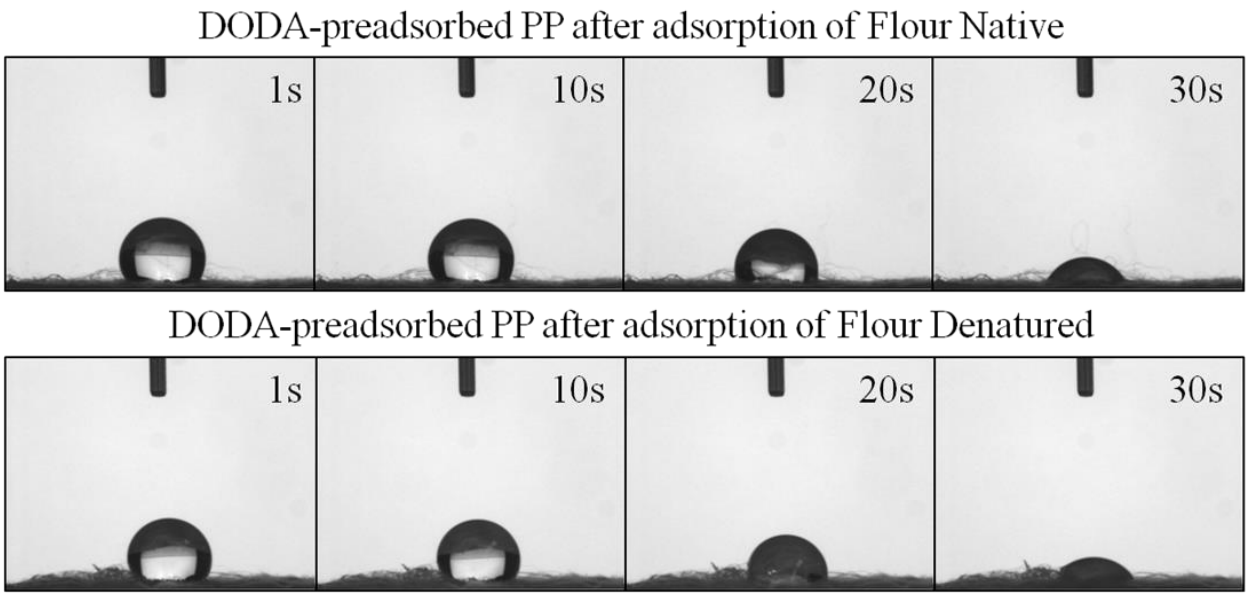


Figure SI-1. Contact angle images for the PP substrates after different treatments studied.

References

1. Johannsmann, D.; Mathauer, K.; Wegner, G.; Knoll, W., *Phys. Rev. B: Condens. Matter* **1992,** 46, 7808-7815.

2. Naderi, A.; Claesson, P. M., *Langmuir* **2006,** 22, 7639-7645.