Supporting Information

Resistance of galactoside-terminated alkanethiol self-assembled monolayers to marine fouling organisms

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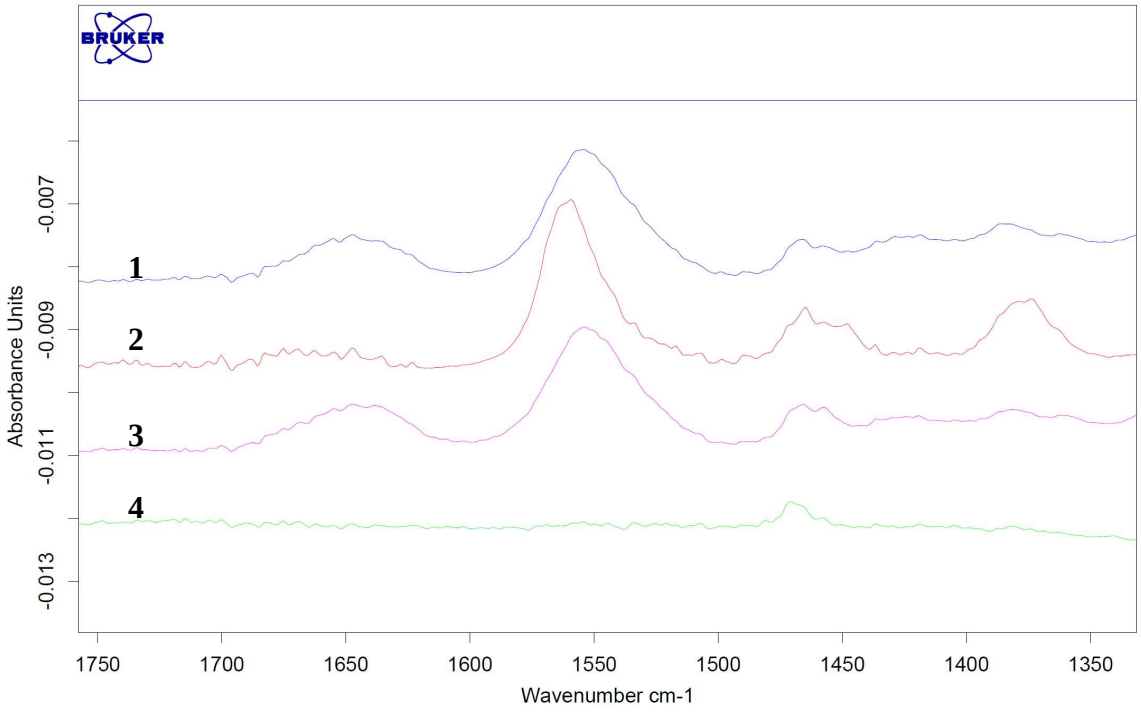


Figure S1. IRAS data for the Amide region of the spectrum.

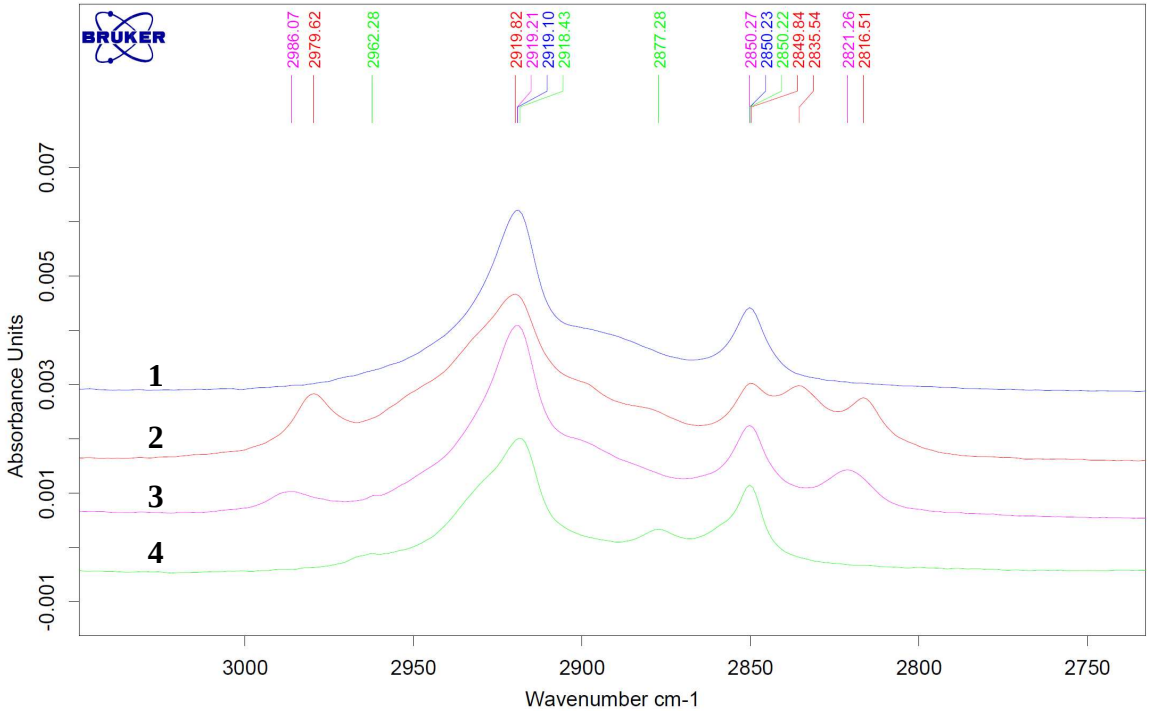


Figure S2. IRAS data for the C-H-strech region of the spectrum.

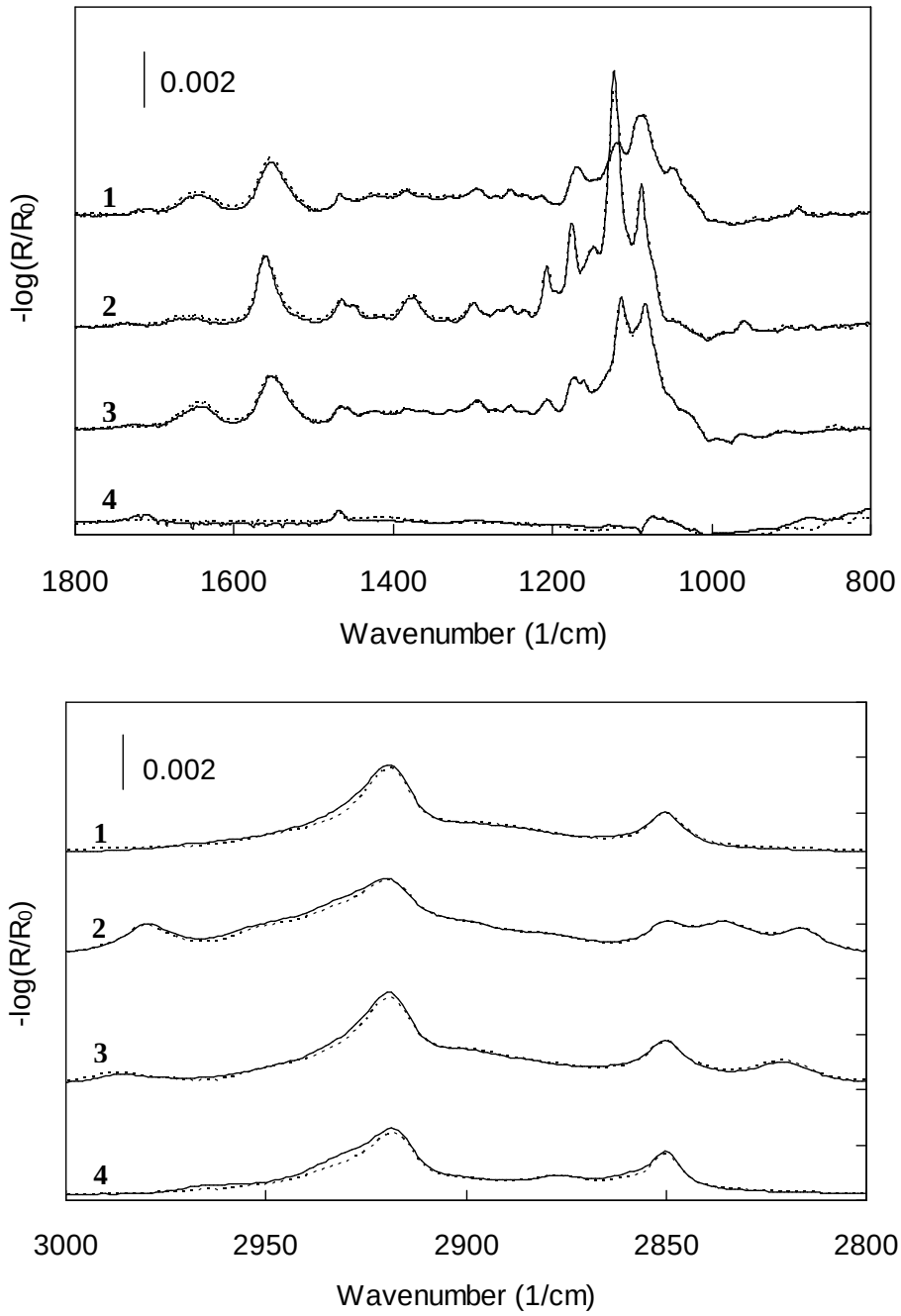
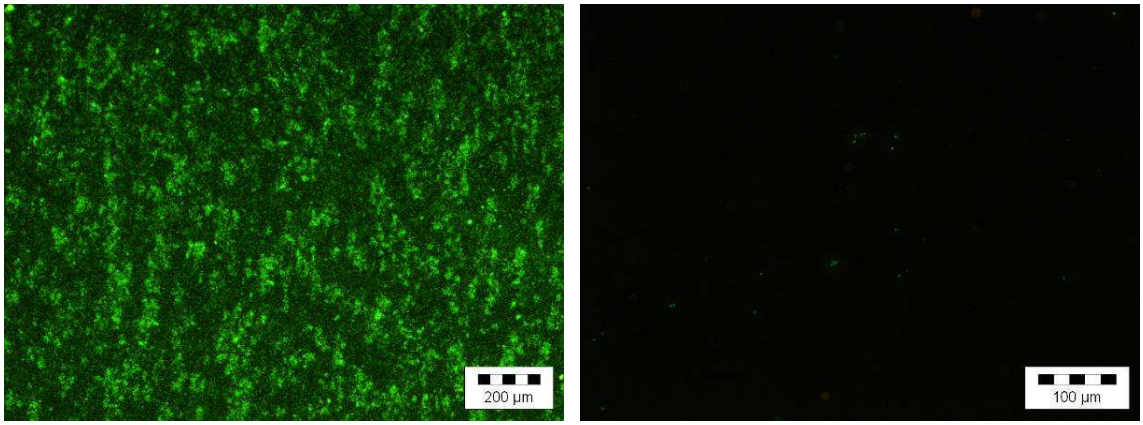
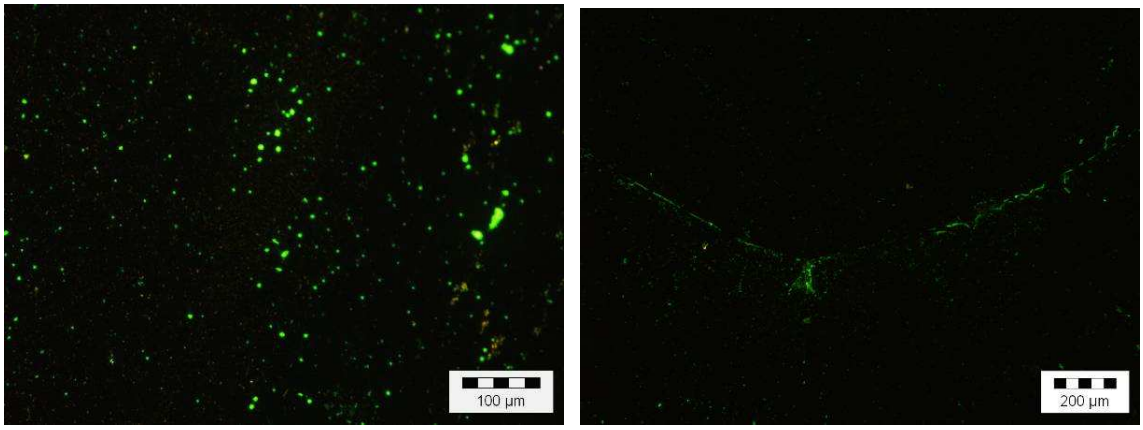


Figure S3. IRAS data for SAMs 1-4 in the Amide and fingerprint regions (upper panel) and C—H stretch region (lower panel). Solid and dashed lines represent the spectrum before and after 60 h immersion in filtered artificial seawater (ASW), respectively. A linear baseline correction and water spectrum subtraction were applied to all spectra. Differences in wettability as measured before and after immersion of the samples in ASW were < 3° for all SAMs, and differences in ellipsometric thickness were < 0.6 Å.

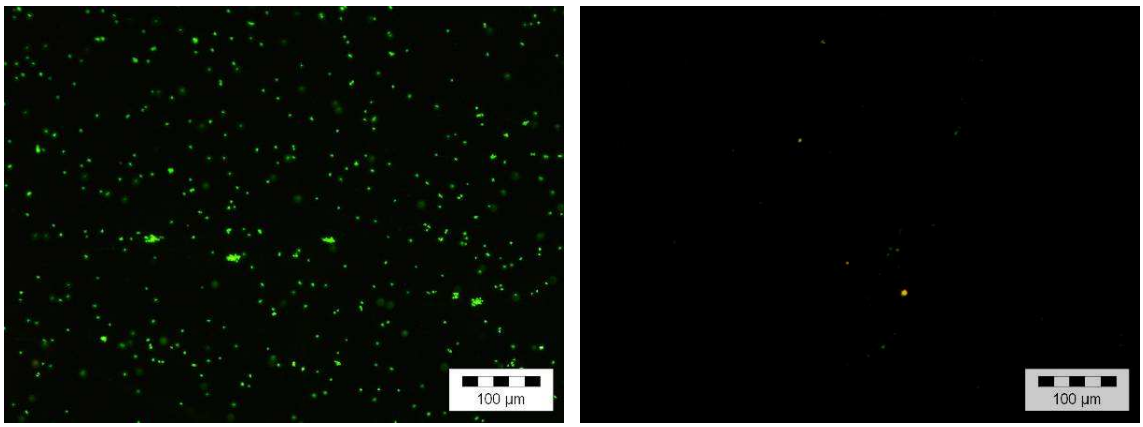
Formation → **After flow cell**



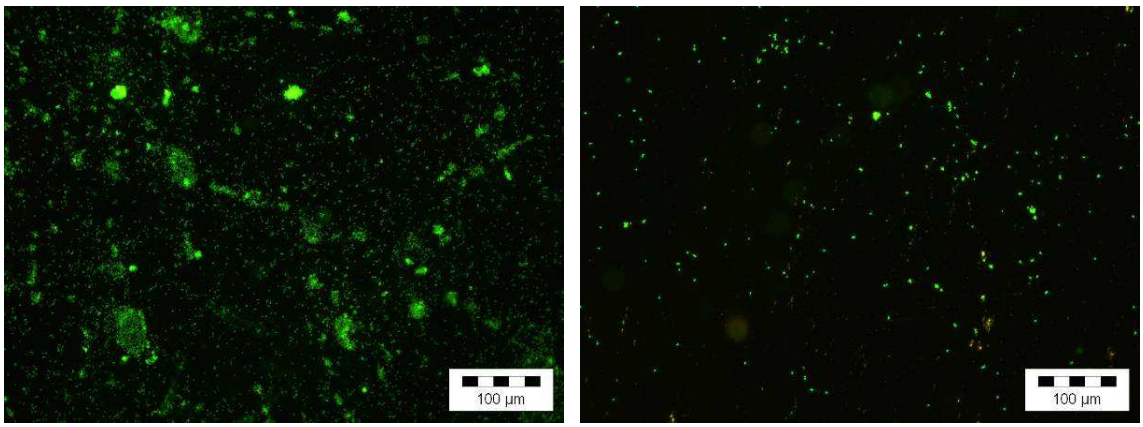
1 Hydroxylated galactoside



2 Methylated galactoside



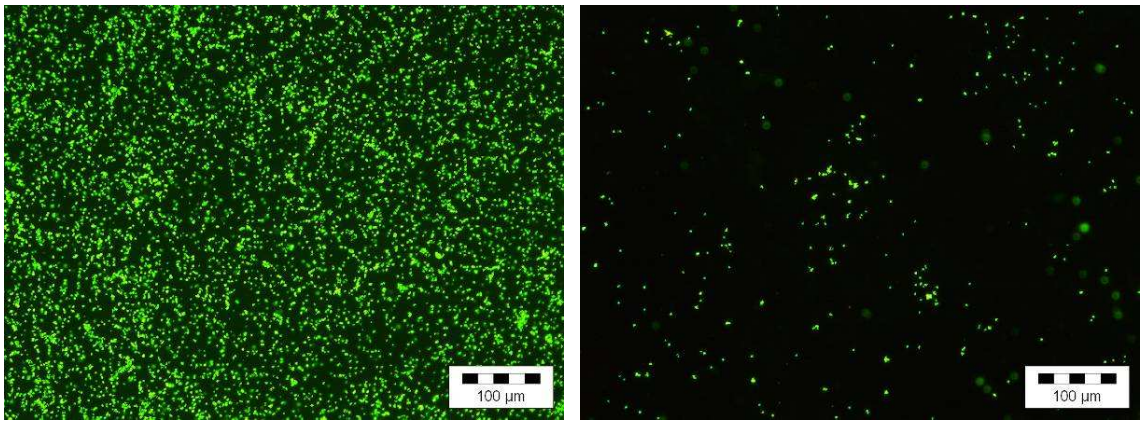
3 Monomethylated galactoside



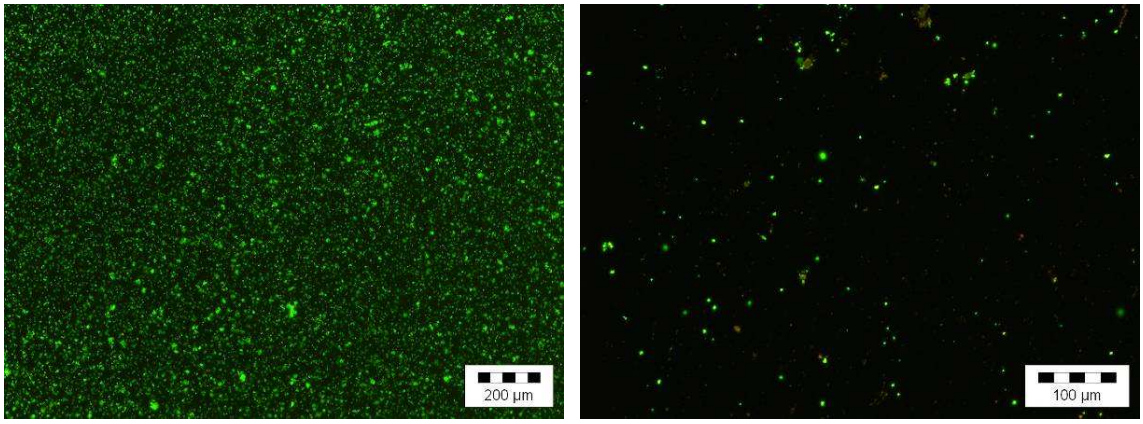
4 CH_3-/OH-terminated alkylthiols

Figure S4: Fluorescence microscopy images illustrating the attachment of *Marinobacter hydrocarbonoclasticus* before and after exposure to the flow cell.

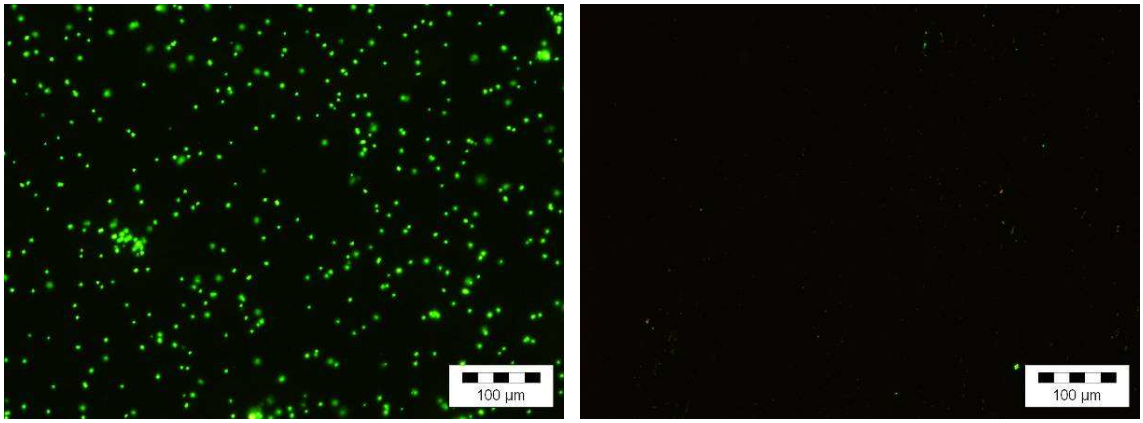
Formation → **After flow cell**



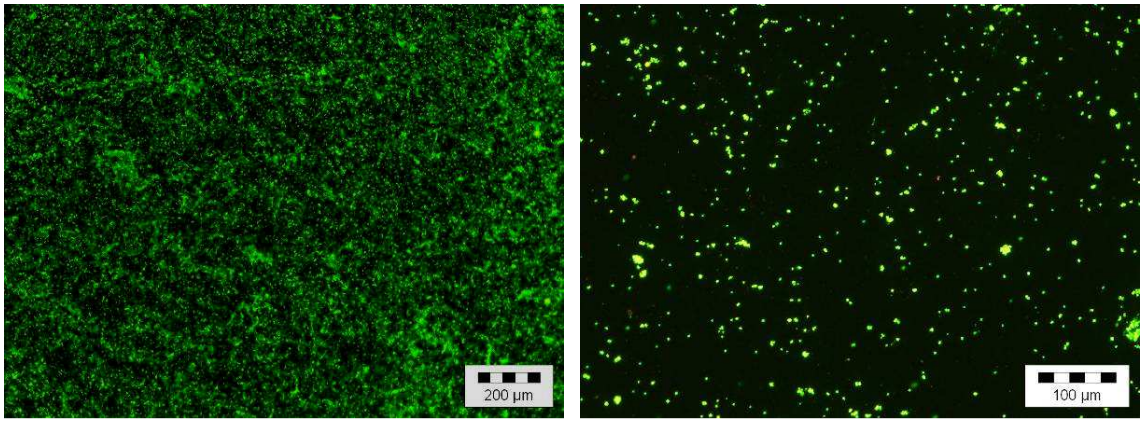
1 Hydroxylated galactoside



2 Methylated galactoside



3 Monomethylated galactoside



4 CH_3-/OH-terminated alkylthiols

Figure S5: Fluorescence microscopy images illustrating the attachment of *Cobetia marina* before and after exposure to the flow cell.

The Good - van Oss - Chaudhury model [1]

The surface free energy is divided into a Lifshitz-van der Waals (dispersive) component γ^{LW} and a Lewis acid-base (polar) component γ^{AB}. The polar component is further split into a Lewis base (electron donor) component γ^- and a Lewis acid (electron acceptor) component γ^+, so that

$$\gamma = \gamma^{LW} + \gamma^{AB} = \gamma^{LW} + 2\sqrt{\gamma^-\gamma^+}$$

For a liquid i, the model provides a relation between the contact angle θ and the contributions to the surface free energy (subscript s indicate the solid, li is liquid i):

$$\gamma_{li}(\cos\theta_{li} + 1) = 2\left[\sqrt{\gamma_s^{LW}\gamma_{li}^{LW}} + \sqrt{\gamma_s^+\gamma_{li}^-} + \sqrt{\gamma_s^-\gamma_{li}^+}\right]$$

If the surface energy components of the liqud are known, and the contact angle is measured, this equation has three unknown variables; $\gamma_s^{LW}, \gamma_s^+$ and γ_s^-. If we choose three different liquids we could solve the system of equations formed from the equation above with each liquid. For convenience, the relation above could be rewritten to

$$\sqrt{\gamma_s^{LW}}\sqrt{\gamma_{li}^{LW}} + \sqrt{\gamma_s^+}\sqrt{\gamma_{li}^-} + \sqrt{\gamma_s^-}\sqrt{\gamma_{li}^+} = \frac{\gamma_{li}}{2}(\cos\theta_{li} + 1)$$

If we take liquid 3 ($l3$) to be a non-polar liquid (for which $\gamma_{l3}^{AB} = \gamma_{l3}^+ = \gamma_{l3}^- = 0$, we obtain γ_s^{LW} directly from

$$\gamma_s^{LW} = \gamma_{l3}^{LW}\frac{(\cos\theta_{l3} + 1)^2}{4}$$

and we can use the thus calculated value of γ_s^{LW} to write a 2×2 equation system

$$\begin{pmatrix} \sqrt{\gamma_{l1}^-} & \sqrt{\gamma_{l1}^+} \\ \sqrt{\gamma_{l2}^-} & \sqrt{\gamma_{l2}^+} \end{pmatrix} \begin{pmatrix} \sqrt{\gamma_s^+} \\ \sqrt{\gamma_s^-} \end{pmatrix} = \begin{pmatrix} \frac{\gamma_{l1}}{2}(\cos\theta_{l1} + 1) - \sqrt{\gamma_s^{LW}}\sqrt{\gamma_{l1}^{LW}} \\ \frac{\gamma_{l2}}{2}(\cos\theta_{l2} + 1) - \sqrt{\gamma_s^{LW}}\sqrt{\gamma_{l2}^{LW}} \end{pmatrix}$$

Having measured the contact angles, all parameters on the right side are known now, so we can solve this for $\sqrt{\gamma_s^+}$ and $\sqrt{\gamma_s^-}$.

For the free energy calculations we have used the following data from [1].

	γ	γ^{LW}	γ^{AB}	γ^+	γ^-
Water	72.8	21.8	51	25.5	25.5
Ethylene glycol	48	29	19	1.92	47
Diiodomethane	50.8	50.8	0	0	0

[1] R.J. Good, *Contact angle, wetting and adhesion: A critical review*, in *Contact angle, wettability and adhesion*, K.L. Mittal (Ed.), VSP: Utrecht **1993**.