**Supporting Information**

**(SI1)**

The van Oss and Good approach to determine the SFE splits the total SFE ( $\gamma_s^{TOT}$ ) in the dispersive Lifshitz–van der Waals interactions ( $\gamma_s^{LW}$ ) and the polar Lewis acid–base interactions ( $\gamma_s^{AB}$ ) as shown in Equation SI1.1. The acid base interactions are further divided into electron donor ( $\gamma_s^-$ ) and electron acceptor ( $\gamma_s^+$ ) parts (Equation SI1.2):[1]

$$\gamma_s^{TOT} = \gamma_s^{LW} + \gamma_s^{AB}, \text{(SI1.1)}$$

$$\gamma_s^{AB} = 2 \cdot \left(\sqrt{\gamma_s^+ \gamma_s^-}\right). \text{(SI1.2)}$$

The $\gamma_s^+$ characterises the tendency of a surface to interact with liquids that are electron donors, while the $\gamma_s^-$ characterises its tendency to interact with liquids that are electron acceptors.[2] Further, the work of adhesion $W_{ad}$ can be related to the measured contact angles ( $\Theta$ ) by taking Young's equation into account:[3]

$$W_{ad} = (1 + \cos\Theta)\gamma_l^{TOT} = 2\left(\sqrt{\gamma_s^{LW}\gamma_l^{LW}} + \sqrt{\gamma_s^+\gamma_l^-} + \sqrt{\gamma_s^-\gamma_l^+}\right), \text{(SI1.3)}$$

Where $\gamma_l^{TOT}$ is the total surface tension of the liquid, $\gamma_s^{LW}$ and $\gamma_l^{LW}$ are the disperzive Lifshitz–van der Waals parts of the liquid and the solid, respectively, and $\gamma_s^+\gamma_l^-$ and $\gamma_s^-\gamma_l^+$ are the acid-base contributions of either the solid or the liquid phase. To resolve the equation one must use at least three test liquids with known $\gamma_l^{TOT}$ , $\gamma_l^{LW}$ , $\gamma_l^-$ , and $\gamma_l^+$.[3] Young's equation can be applied for ideal surfaces, which are flat, inert, and chemically homogeneous, but doesn't estimate the energy of a surface which is not ideal. The SFE calculations in this work were carried out for an ideal surface.

Table S1.1: $\gamma_l^{TOT}$ , $\gamma_l^{LW}$ , $\gamma_l^+$ , $\gamma_l^-$ values for water, ethylene glycol, formamide, and diiodomethane as chosen in this work.

| **Liquid** | $\gamma_l^{TOT}$ | $\gamma_l^{LW}$ | $\gamma_l^+$ | $\gamma_l^-$ | Author |
|---|---|---|---|---|---|
| Water | 72.8 | 21.8 | 25.5 | 25.5 | Erbil |
| Ethylene glycol | 48.0 | 29.0 | 3.0 | 30.1 | Van OSs |
| Formamide | 58.0 | 39.0 | 2.28 | 39.6 | Van Oss |
| Diiodomethane | 50.8 | 50.8 | 0.7 | 0.0 | Gonzáles-Martin |

**Compression experiments**

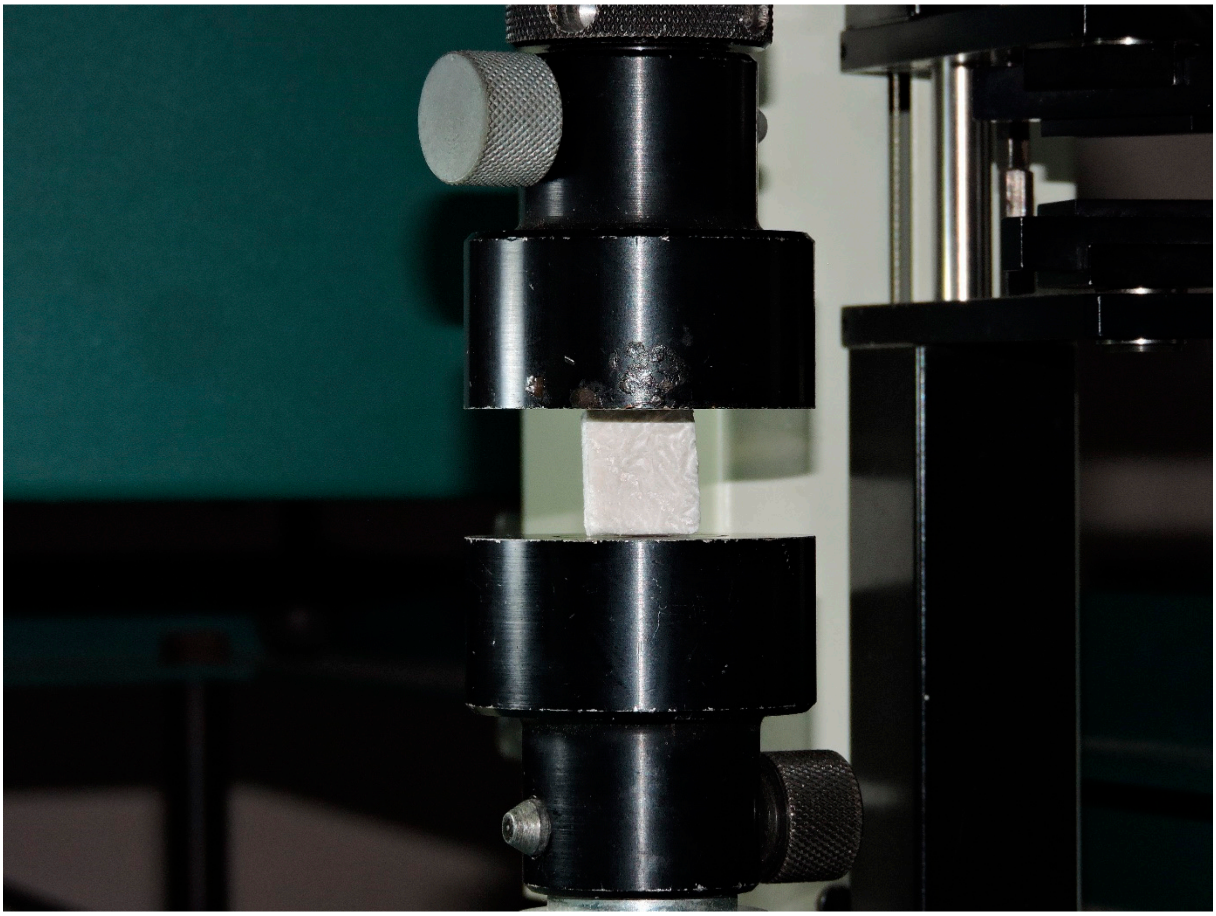

**Figure S1**: Experimental set-up for compression tests.

**References**


1. Mohan, T. *et al.* Wettability and surface composition of partly and fully regenerated cellulose thin films from trimethylsilyl cellulose. *J. Colloid Interface Sci.* **358,** 604–610 (2011).
2. Peršin, Z., Stenius, P. & Stana-Kleinschek, K. Estimation of the surface energy of chemically and oxygen plasma-treated regenerated cellulosic fabrics using various calculation models. *Text. Res. J.* **81,** 1673–1685 (2011).
3. Mohan, T. *et al.* Cationically rendered biopolymer surfaces for high protein affinity support matrices. *Chem. Commun.* **49,** 11530 (2013).