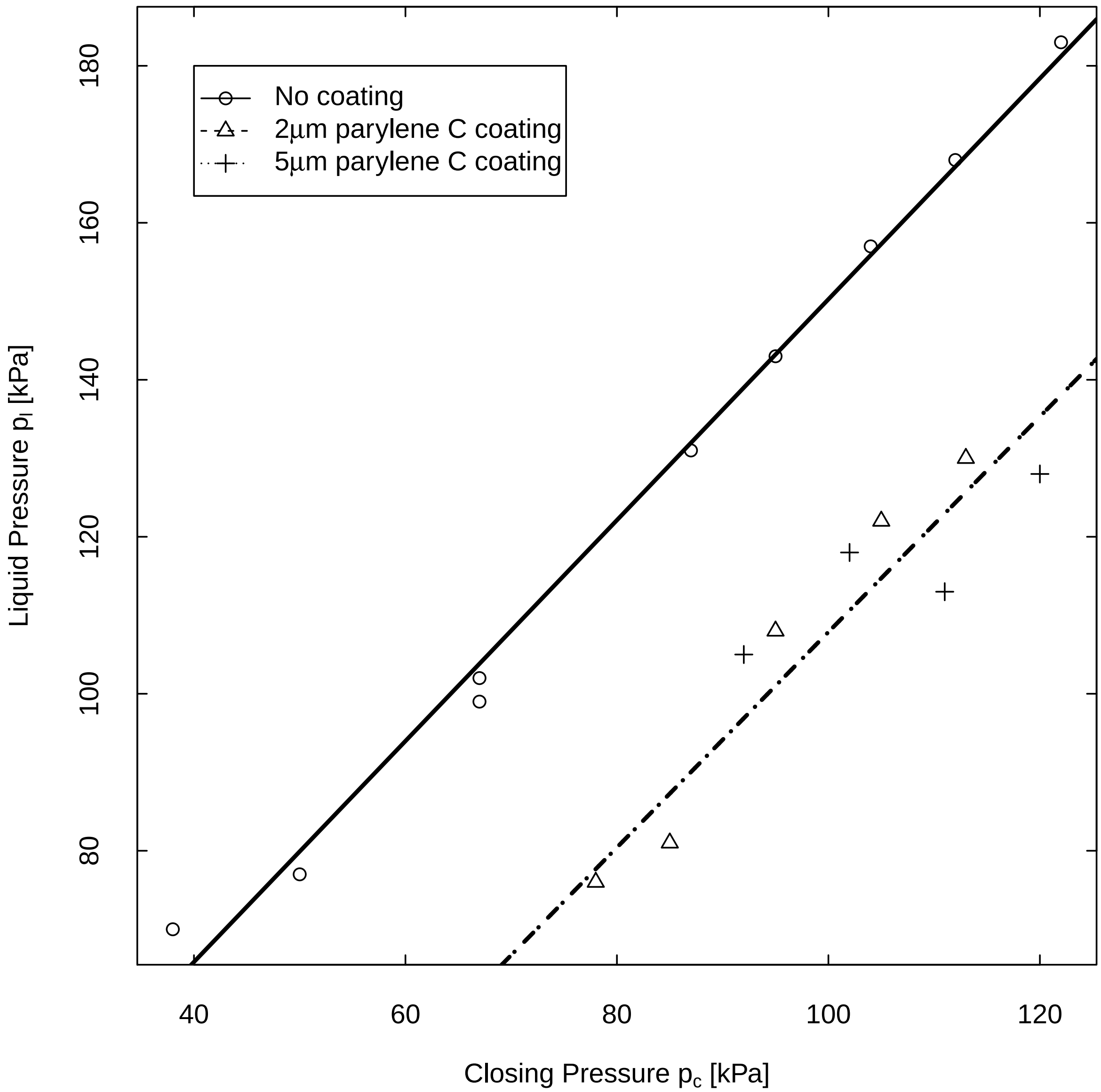
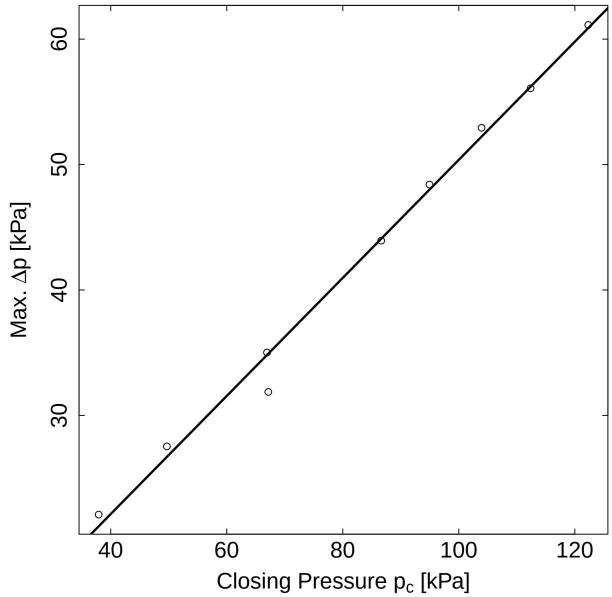
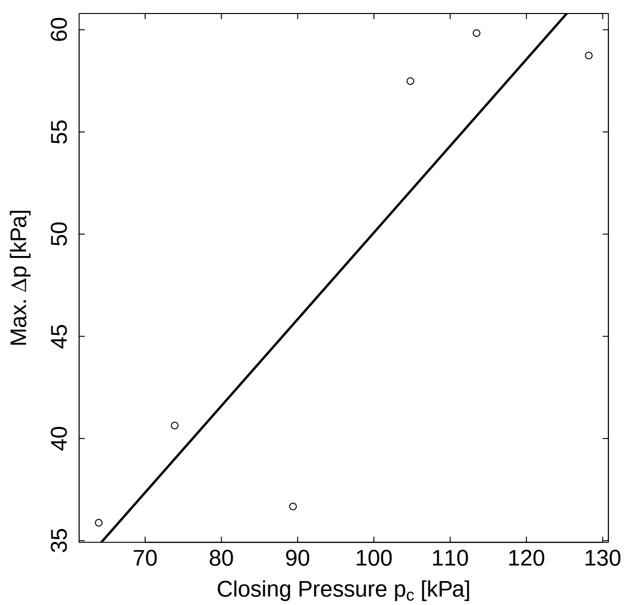


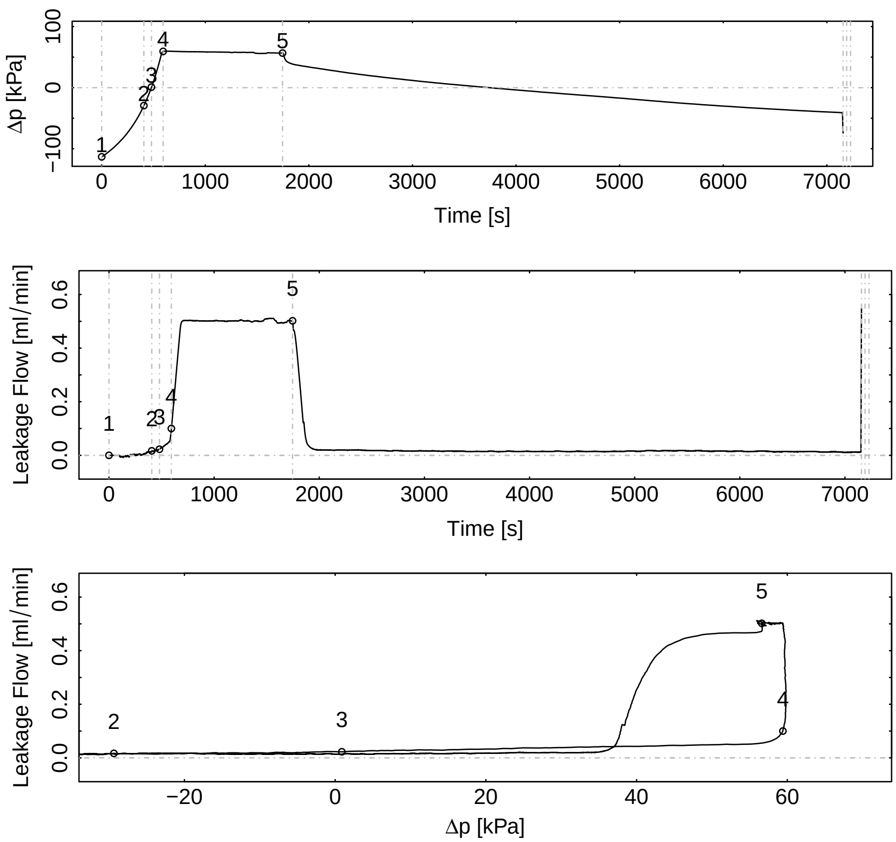
S 1: Maximum liquid pressure p_l as a function of valve closing pressure p_c for investigation of parylene coating influence on valve performance. Measurement points of an uncoated valve (circle), 2 µm parylene C coating thickness (triangle) and 5 µm parylene C coating thickness (cross) including their linear regression are visualized. With constant closing pressures lower liquid pressures are acceptable with parylene coated valves, indicating a performance loss. The coating thickness does not have an influence on the valve performance for the two valves tested.



S 2: Maximum delta pressure $\Delta p = p_{\mathrm{l}} - p_{\mathrm{c}}$ as a function of closing pressure p_{c} for **water** at 20° C of an uncoated valve. The liquid pressure p_{l} can exceed the closing pressure by a factor $p_{\mathrm{l}}/p_{\mathrm{c}} \approx 1.5$ before leakage of the valve gets measurable with the used setup. This effect is accounted to van der Waals adhesion forces acting between PDMS and Polycarbonate layers, keeping the valve closed against a certain amount of counter pressure.



S 3: Maximum delta pressure $\Delta p = p_{\mathrm{l}} - p_{\mathrm{c}}$ as a function of closing pressure p_{c} for **isopropanol** at 20° C of an uncoated valve. The liquid pressure p_{l} can exceed the closing pressure by a factor $p_{\mathrm{l}}/p_{\mathrm{c}} \approx 1.5$ before leakage of the valve gets measurable with the used setup. This effect is accounted to van der Waals adhesion forces acting between PDMS and Polycarbonate layers, keeping the valve closed.



S 4: (Top) Pressure curve $\Delta p = p_{\mathrm{l}} - p_{\mathrm{c}}$ for a closed system with a compressible air encapsulation sealed by a thin membrane PDMS valve with closing pressure p_{c}=110 kPa and an input pumping rate of q_{in}=0.5 ml/min, until point 5, at which the pump is switched off. Between points 1 and 2 the encapsulated air is compressed while the valve is tightly sealed. Point 3 marks the point where $p_{\mathrm{c}} = p_{\mathrm{l}}$ and leakage can be expected. Beginning from point 4 a stable state is reached where the leakage q_{out} is as big as the input flow rate q_{in}, until the pump is stopped at 5 and a relaxation of the gas volume takes place. (Middle) Corresponding leakage volume flow through the thin membrane PDMS valve calculated from the pressure curve above. (Bottom) Corresponding graph of volume flow over Δp resulting in a hysteresis following the points of the pressure curve above. The experiment is carried out with **isopropanol** at 20° C and shows great analogy to experiments carried out in water (see paper). This results show that hydrophobic interactions can *not* be the only reason for adhesion for the surfaces in contact and lead to the assumption of van der Waals interactions being the reson for adhesion.