# Supporting Material

## Appendix A

Pictures of apparent contact angles are presented for all studied conditions in the Figure 1.

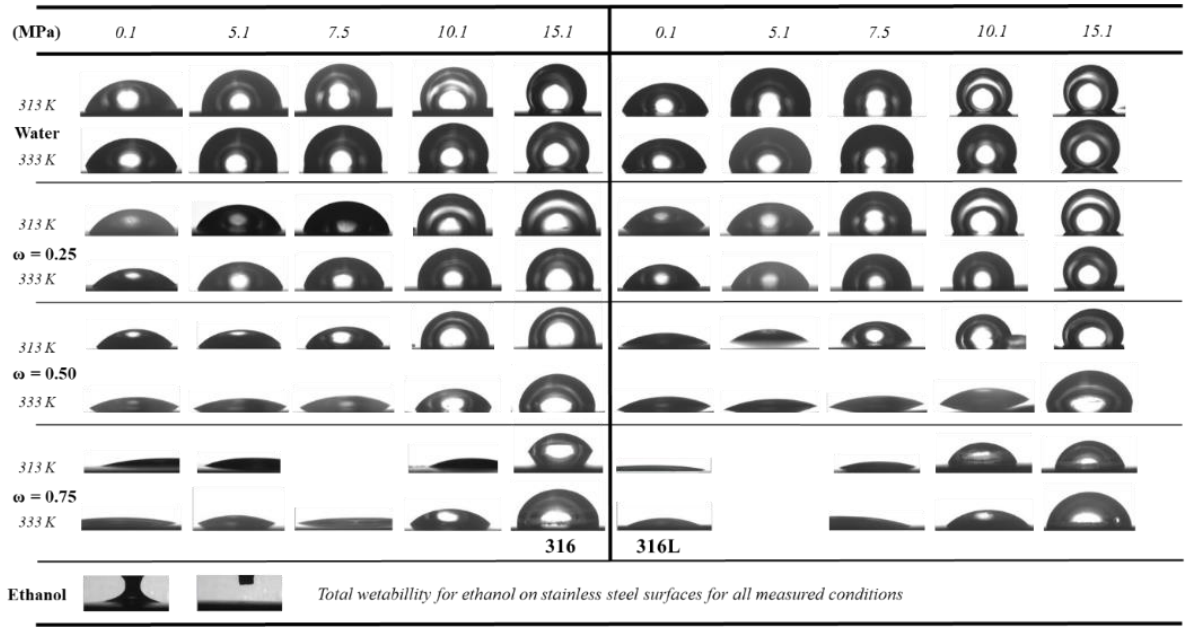


*Figure 1 Apparent contact angles through all explored conditions*

## Appendix B

Corrections of the apparent contact angles through the Wenzel equation are presented for various roughness parameters in the Figure 2.

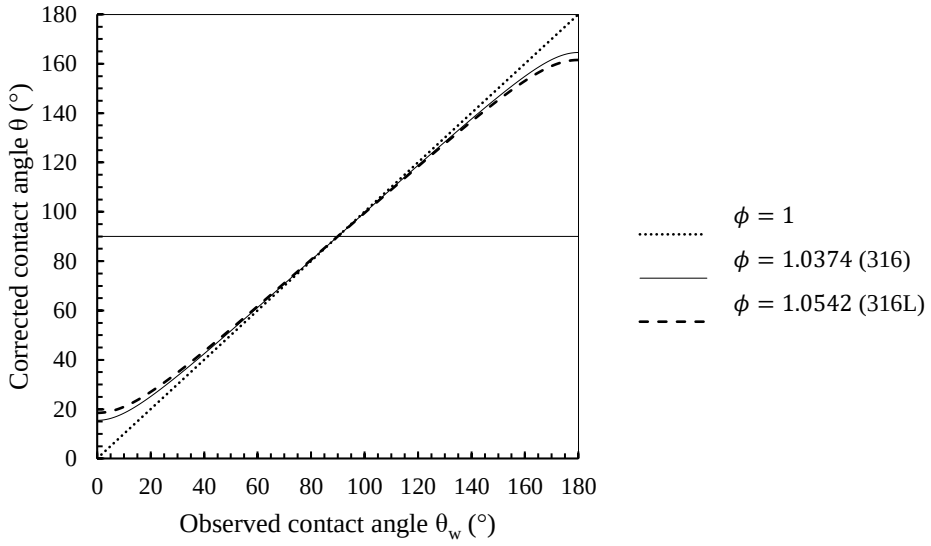


*Figure 2 Roughness effect following the Wenzel equation considering maximal values of $\phi$ parameter for AISI 316 and AISI 316L surfaces*

## Appendix C

Table 1 and Table 2 regroup all averages of corrected contact angles obtained in this work with the statistical uncertainties calculated for a 95% confidence level. Each measurement was carried out at least in triplicate then corrected through the Wenzel equation and finally averaged.

*Table 1 Data of corrected contact angle (CA) at 313.15 K for AISI 316 and AISI 316L with statistical uncertainties*

| P (MPa) | T (K) | $\omega_{ethanol}$ | CA 316 (°) | CA 316L (°) |
|---|---|---|---|---|

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 0.1 | 313.15 | 0 | 79 | ± | 8 | 78 | ± | 10 |
| 5.1 | 313.15 | 0 | 92 | ± | 4 | 103 | ± | 8 |
| 7.5 | 313.15 | 0 | 104 | ± | 6 | 108 | ± | 8 |
| 10.1 | 313.15 | 0 | 102 | ± | 6 | 122 | ± | 9 |
| 15.1 | 313.15 | 0 | 112 | ± | 7 | 125 | ± | 15 |
| 0.1 | 313.15 | 0.25 | 61 | ± | 2 | 60 | ± | 4 |
| 5.1 | 313.15 | 0.25 | 68 | ± | 6 | 72 | ± | 3 |
| 7.5 | 313.15 | 0.25 | 87 | ± | 4 | 92 | ± | 6 |
| 10.1 | 313.15 | 0.25 | 94 | ± | 7 | 117 | ± | 6 |
| 15.1 | 313.15 | 0.25 | 93 | ± | 5 | 118 | ± | 6 |
| 0.1 | 313.15 | 0.5 | 47 | ± | 3 | 39 | ± | 3 |
| 5.1 | 313.15 | 0.5 | 50 | ± | 3 | 42 | ± | 4 |
| 7.5 | 313.15 | 0.5 | 63 | ± | 11 | 72 | ± | 5 |
| 10.1 | 313.15 | 0.5 | 93 | ± | 3 | 86 | ± | 14 |
| 15.1 | 313.15 | 0.5 | 96 | ± | 5 | 116 | ± | 16 |
| 0.1 | 313.15 | 0.75 | 22 | ± | 3 | 25 | ± | 4 |
| 5.1 | 313.15 | 0.75 | 27 | ± | 3 | | | |
| 7.5 | 313.15 | 0.75 | | | | 27 | ± | 3 |
| 10.1 | 313.15 | 0.75 | 33 | ± | 4 | 64 | ± | 9 |
| 15.1 | 313.15 | 0.75 | 62 | ± | 3 | 82 | ± | 6 |
| 0.1 | 313.15 | 1 | 0 | | | 0 | | |
| 5.1 | 313.15 | 1 | 0 | | | 0 | | |
| 7.5 | 313.15 | 1 | 0 | | | 0 | | |

*Table 2 Data of corrected contact angle (CA) at 333.15 K for AISI 316 and AISI 316L with statistical uncertainties*

| **P (MPa)** | **T (K)** | **$\omega_{ethanol}$** | **CA 316 (°)** | | | **CA 316L (°)** | | |
|---|---|---|---|---|---|---|---|---|
| 0.1 | 333.15 | 0 | 66 | ± | 6 | 76 | ± | 1 |
| 5.1 | 333.15 | 0 | 97 | ± | 2 | 94 | ± | 3 |
| 7.5 | 333.15 | 0 | 96 | ± | 5 | 103 | ± | 3 |
| 10.1 | 333.15 | 0 | 102 | ± | 14 | 117 | ± | 2 |
| 15.1 | 333.15 | 0 | 117 | ± | 4 | 128 | ± | 3 |
| 0.1 | 333.15 | 0.25 | 51 | ± | 6 | 60 | ± | 7 |
| 5.1 | 333.15 | 0.25 | 56 | ± | 7 | 71 | ± | 4 |
| 7.5 | 333.15 | 0.25 | 77 | ± | 2 | 84 | ± | 4 |
| 10.1 | 333.15 | 0.25 | 94 | ± | 4 | 105 | ± | 5 |
| 15.1 | 333.15 | 0.25 | 105 | ± | 2 | 120 | ± | 1 |
| 0.1 | 333.15 | 0.5 | 38 | ± | 3 | 37 | ± | 3 |
| 5.1 | 333.15 | 0.5 | 34 | ± | 2 | 32 | ± | 4 |
| 7.5 | 333.15 | 0.5 | 34 | ± | 6 | 38 | ± | 6 |
| 10.1 | 333.15 | 0.5 | 63 | ± | 3 | 44 | ± | 5 |
| 15.1 | 333.15 | 0.5 | 82 | ± | 3 | 78 | ± | 3 |
| 0.1 | 333.15 | 0.75 | 21 | ± | 1 | 27 | ± | 4 |
| 5.1 | 333.15 | 0.75 | 24 | ± | 5 | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 7.5 | 333.15 | 0.75 | 26 | ± | 4 | 29 | ± | 3 |
| 10.1 | 333.15 | 0.75 | 53 | ± | 5 | 47 | ± | 2 |
| 15.1 | 333.15 | 0.75 | 75 | ± | 3 | 77 | ± | 4 |
| 0.1 | 333.15 | 1 | 0 | | | 0 | | |
| 5.1 | 333.15 | 1 | 0 | | | 0 | | |
| 7.5 | 333.15 | 1 | 0 | | | 0 | | |
| 10.1 | 333.15 | 1 | 0 | | | 0 | | |

## Appendix D

The ratio $\gamma_{SF}/\gamma_{LF}$ of water at 313 K in saturated dense $CO_2$ as a function of pressure is presented in Figure 3. Data of $\gamma_{SF}$ are taken from [52] and data of $\gamma_{LF}$ are taken from [34].

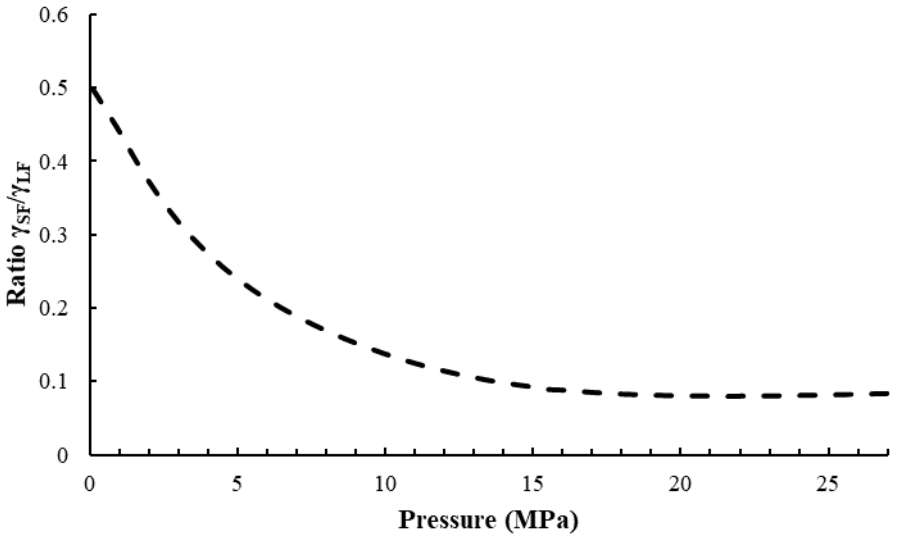


*Figure 3 Ratio $\gamma_{SF}/\gamma_{LF}$ as a function of pressure for $CO_2$/water/ stainless steel system at 313 K, data used are from [52] for $\gamma_{SF}$ and from [34] for $\gamma_{LF}$*

## Appendix E

Influence of the chemical heterogeneity of the solid/liquid interface for various arbitrary wetted fraction σ is presented in Figure 4.

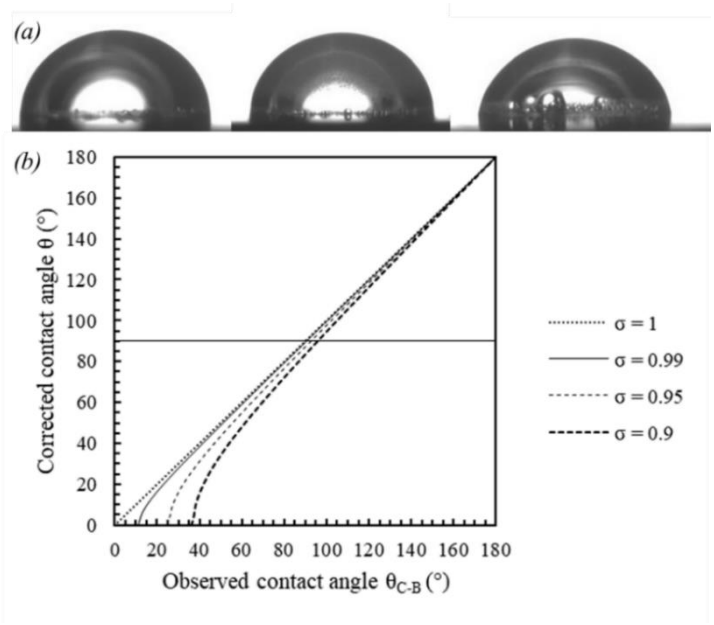


*Figure 4 (a) picture of trapped bubbles, (b) correction of the observed contact angle through the Cassie-Baxter equation for various arbitrary wetted fraction*