# Supporting Information

# for

# Ultrasmall magnetic field-effect and sign reversal in transistors based on donor/acceptor systems

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## The dependency of magnetoresistance on the drain and gate voltage for Spiro-TTB/HAT-CN for different mixing ratios and resulting fit parameters

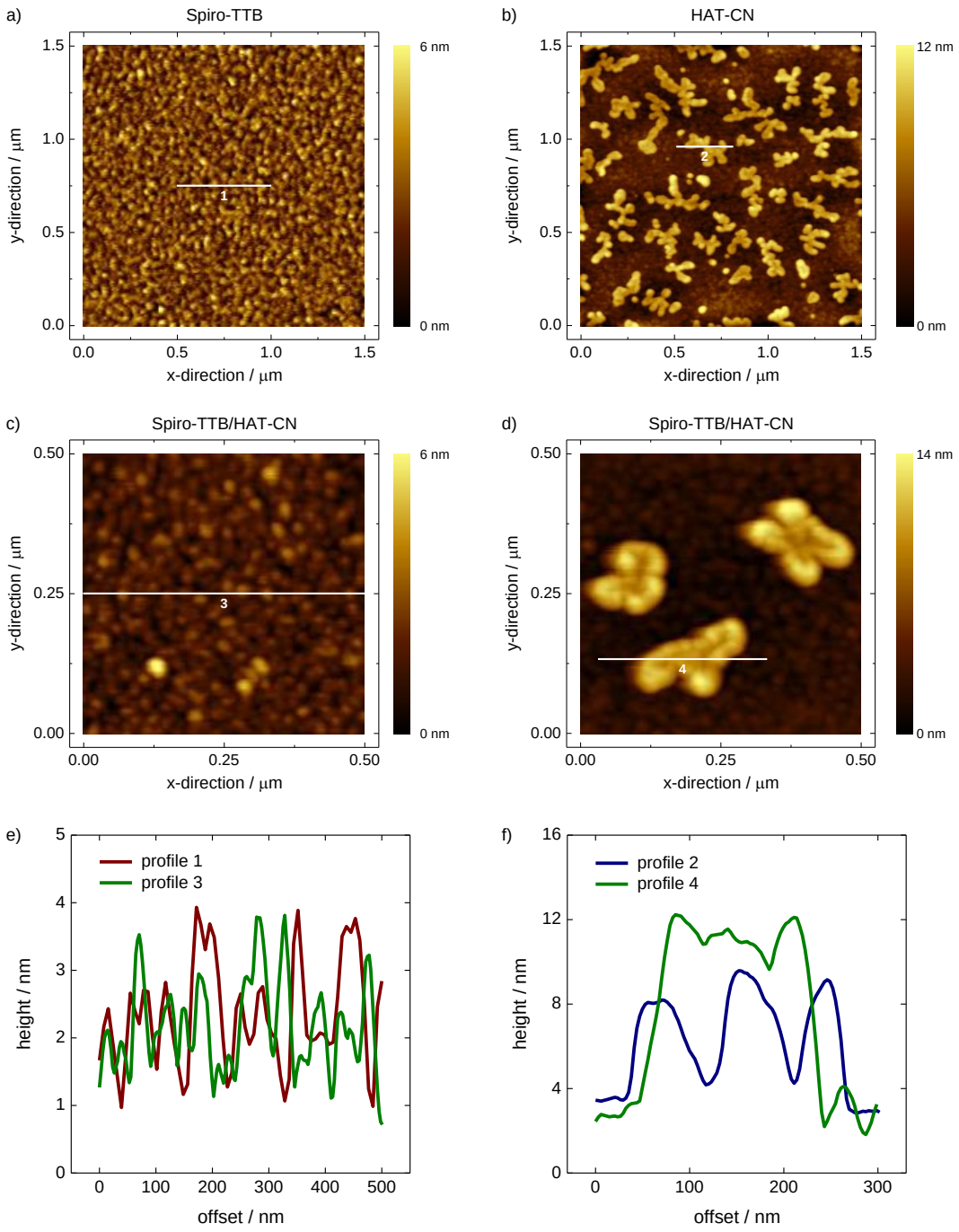


**Figure S1:** AFM measurements of a) 130 nm thin Spiro-TTB films, b) 1 nm thin HAT-CN films and c), d) 20 nm thin coevaporated Spiro-TTB/HAT-CN films (51:49) as well as e), f) representative height profile-lines of the corresponding surface structures are shown. The mixed Spiro-TTB/HAT-CN thin-film system contains relative smooth areas with similar surface features as individual Spiro-TTB films *and* island-like structures of similar form and dimension as the surface structures of individual HAT-CN films.

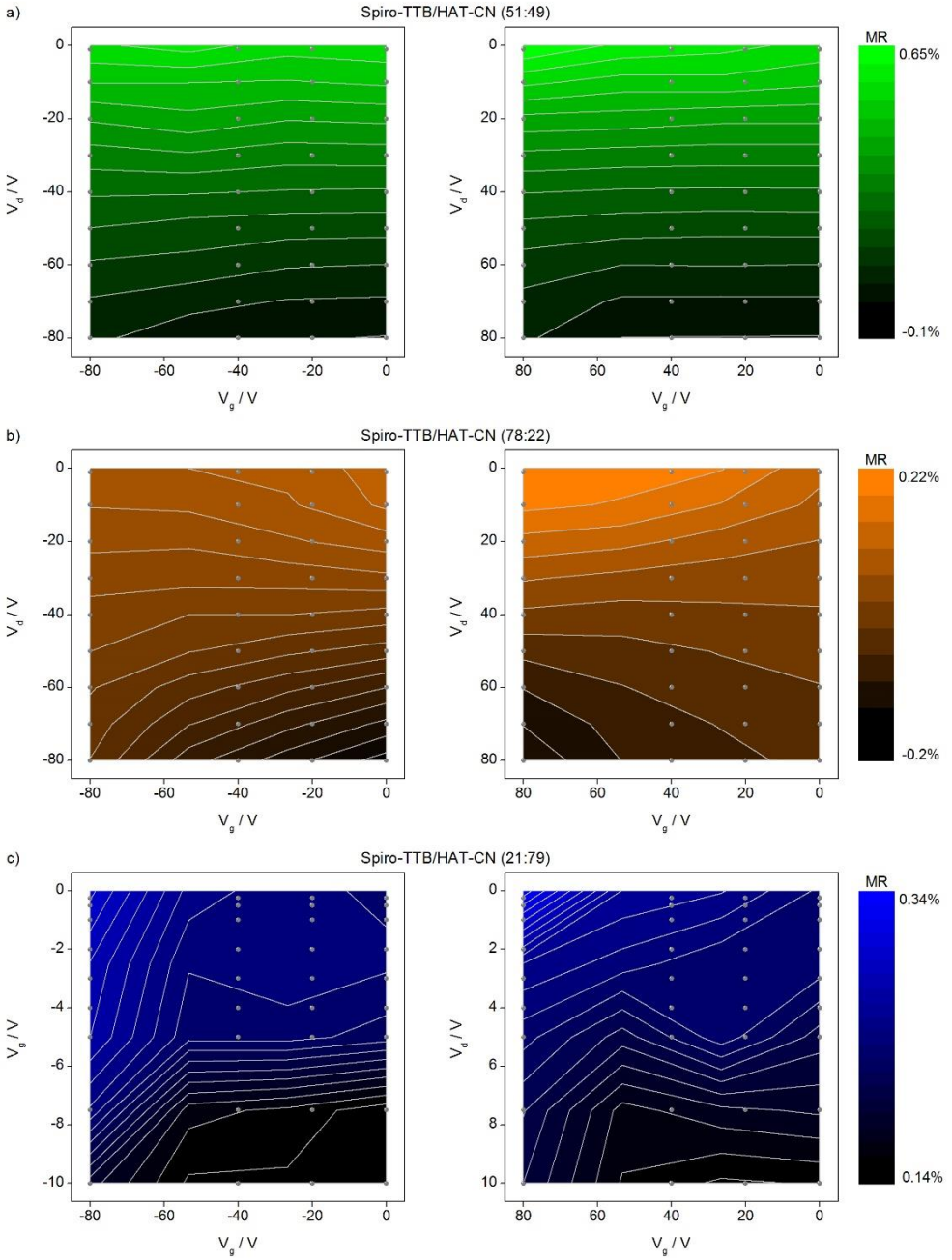


**Figure S2:** The dependency of magnetoresistance on the drain and gate voltage for Spiro-TTB/HAT-CN for different mixing ratios: (a) (51:49), (b) (78:22) and (.c) (21:79). Graphs on the left and right side refer to *p*-channel and *n*-channel conditions, respectively. Values between the experimental data was interpolated with the *Renka-Cline Fit*. Experimental data-points are highlighted by grey dots. A colour scaling of the MR values is integrated as well. It applies to both graphs of one mixing ratio. All measurements were carried out for $B$ = 60 mT.

**Table S1:** Fit results of the MR(*B*) curves for Spiro-TTB/HAT-CN with a mixing ratio of 51:49 at different drain voltages.

| $V_d$ [V] | Non-Lorentz Fit | | | Lorentz Fit | | |
|---|---|---|---|---|---|---|
| | $MR_\infty$[a] [mT] | $B_0$[a] [mT] | $QF$[b] | $MR_\infty$[a] [mT] | $B_0$[a] [mT] | $QF$[b] |
| | Spiro-TTB/HAT-CN (1:1) | | | | | |
| 1 | 0.760±0.015 | 1.86±0.09 | 0.992 | 0.692±0.020 | 4.32±0.56 | 0.944 |
| 2.5 | 0.743±0.017 | 1.93±0.10 | 0.991 | 0.676±0.018 | 4.44±0.50 | 0.950 |
| 5 | 0.701±0.008 | 2.02±0.08 | 0.992 | 0.636±0.013 | 4.51±0.40 | 0.960 |
| -5 | 0.703±0.008 | 1.95±0.10 | 0.990 | 0.638±0.013 | 4.45±0.39 | 0.961 |
| 10 | 0.608±0.010 | 1.98±0.08 | 0.993 | 0.552±0.017 | 4.62±0.59 | 0.941 |
| 15 | 0.529±0.010 | 2.06±0.08 | 0.992 | 0.479±0.015 | 4.74±0.61 | 0.940 |
| 25 | 0.401±0.007 | 2.28±0.09 | 0.992 | 0.361±0.012 | 5.18±0.67 | 0.933 |
| 40 | 0.244±0.005 | 2.50±0.10 | 0.990 | 0.219±0.006 | 5.66±0.60 | 0.940 |
| 80 | -0.076±0.002 | 2.15±0.12 | 0.988 | -0.069±0.002 | 4.96±0.66 | 0.934 |
| 90 | -0.131±0.003 | 2.22±0.11 | 0.990 | -0.118±0.003 | 5.16±0.50 | 0.950 |
| 100 | -0.175±0.004 | 2.40±0.10 | 0.990 | -0.158±0.004 | 5.54±0.58 | 0.941 |

[a]Applied fit parameters according to Equations S1 and S2. The Lorentzian line shape can be described by the following equation:

$$MR(B) = MR_\infty \frac{B^2}{B^2 + B_{0'}^2} \qquad \text{(S1)}$$

while the Non-Lorentzian line shape is written as

$$MR(B) = MR_\infty \frac{B^2}{(|B| + B_0)^2} \qquad \text{(S2)}$$

whereas $B$ is the applied magnetic field, $MR_\infty$ is the saturation value of MR for an infinite magnetic-field strength, $B_{0'}$ gives the half width at half maximum of MR and $B_0$ gives the half width at quarter maximum of MR.

[b]QF = Quality of fit. The best fit has a QF value of 1.

**Table S2:** Fit results of the MR(*B*) curves for Spiro-TTB/HAT-CN with a mixing ratio of 78:22 at different drain voltages.

| $V_d$ [V] | Non-Lorentz Fit | | | Lorentz Fit | | |
|---|---|---|---|---|---|---|
| | $MR_\infty$[a] [mT] | $B_0$[a] [mT] | $QF$[b] | $MR_\infty$[a] [mT] | $B_0$[a] [mT] | $QF$[b] |
| | Spiro-TTB/HAT-CN (4:1) | | | | | |
| -1 | 0.166±0.001 | 1.80±0.07 | 0.993 | 0.151±0.005 | 4.28±0.67 | 0.933 |
| -5 | 0.168±0.002 | 1.73±0.13 | 0.987 | 0.154±0.005 | 4.17±0.58 | 0.942 |
| -10 | 0.156±0.003 | 1.80±0.17 | 0.983 | 0.143±0.004 | 4.32±0.48 | 0.952 |
| -12.5 | 0.143±0.004 | 1.73±0.26 | 0.974 | 0.130±0.003 | 4.06±0.41 | 0.960 |
| -15 | 0.133±0.002 | 1.74±0.13 | 0.987 | 0.122±0.004 | 4.18±0.53 | 0.947 |
| -20 | 0.116±0.003 | 1.70±0.24 | 0.976 | 0.107±0.003 | 4.18±0.46 | 0.954 |
| -60 | -0.138±0.002 | 2.66±0.17 | 0.983 | -0.123±0.005 | 5.94±0.81 | 0.919 |
| -70 | -0.201±0.004 | 2.57±0.19 | 0.981 | -0.178±0.006 | 5.63±0.70 | 0.930 |
| -80 | -0.262±0.005 | 2.41±0.19 | 0.981 | -0.235±0.003 | 5.49±0.66 | 0.934 |
| -90 | -0.319±0.006 | 2.46±0.21 | 0.979 | -0.286±0.008 | 5.57±0.62 | 0.938 |
| -100 | -0.369±0.007 | 2.49±0.20 | 0.980 | -0.369±0.007 | 5.64±0.65 | 0.935 |

[a]Applied fit parameters according to Equations S1 and S2.

[b]QF = Quality of fit. The best fit has a QF value of 1.

**Table S3:** Fit results of the MR(*B*) curves for Spiro-TTB/HAT-CN with a mixing ratio of 21:79 at different drain voltages.

| $V_d$ [V] | Non-Lorentz Fit | | | Lorentz Fit | | |
|---|---|---|---|---|---|---|
| | $MR_\infty$[a] [mT] | $B_0$[a] [mT] | $QF$[b] | $MR_\infty$[a] [mT] | $B_0$[a] [mT] | $QF$[b] |
| | Spiro-TTB/HAT-CN (1:4) | | | | | |
| 0.1 | 0.348±0.005 | 2.78±0.18 | 0.982 | 0.309±0.012 | 6.16±0.88 | 0.911 |
| 0.25 | 0.344±0.014 | 2.83±0.48 | 0.952 | 0.305±0.009 | 6.12±0.69 | 0.931 |
| 0.5 | 0.345±0.008 | 2.79±0.26 | 0.974 | 0.308±0.010 | 6.18±0.74 | 0.926 |
| 1 | 0.342±0.010 | 2.98±0.35 | 0.965 | 0.303±0.011 | 6.52±0.84 | 0.916 |
| 2.5 | 0.318±0.008 | 3.03±0.31 | 0.969 | 0.281±0.011 | 6.54±0.89 | 0.911 |
| 5 | 0.289±0.011 | 3.13±0.45 | 0.955 | 0.256±0.009 | 6.68±0.82 | 0.918 |
| 10 | 0.234±0.010 | 3.18±0.50 | 0.950 | 0.207±0.007 | 6.93±0.77 | 0.923 |

[a]Applied fit parameters according to Equations S1 and S2.

[b]QF = Quality of fit. The best fit has a QF value of 1.