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Supporting Information

for

Exploring the fabrication and transfer mechanism of metallic nanostructures on carbon nanomembranes via focused electron beam induced processing

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Additional experimental data

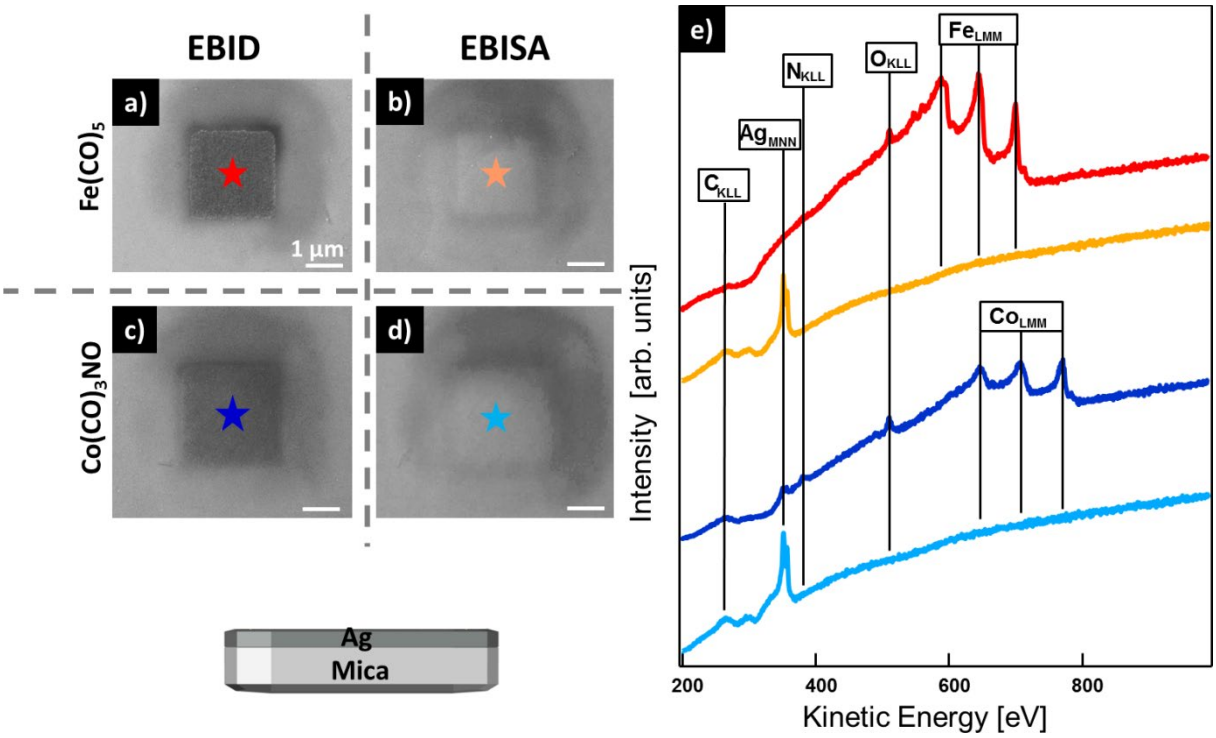

Figure S1: Results of FEBIP experiments followed by autocatalytic growth on Ag(111)/mica. All structures were written with E_{beam} = 15 kV and I_{beam} = 3 nA. (a) SEM image of a 2 × 2 µm^2 deposit fabricated via EBID + AG with $Fe(CO)_5$ (4.7 C/cm^2 and t_{AG} = 2 h 26 min). (b) SEM image of a 2 × 2 µm^2 deposit fabricated via EBISA + AG with $Fe(CO)_5$ (10.1 C/cm^2 and t_{AG} = 2 h 41 min). (c) SEM image of a 2 × 2 µm^2 deposit fabricated via EBID + AG with $Co(CO)_3NO$ (4.7 C/cm^2 and t_{AG} = 2 h 24 min). (d) SEM image of a 2 × 2 µm^2 deposit fabricated via EBISA + AG with $Co(CO)_3NO$ (10.1 C/cm^2 and t_{AG} = 2 h 47 min). (e) Local AE spectra recorded at the positions indicated with the correspondingly colored stars.

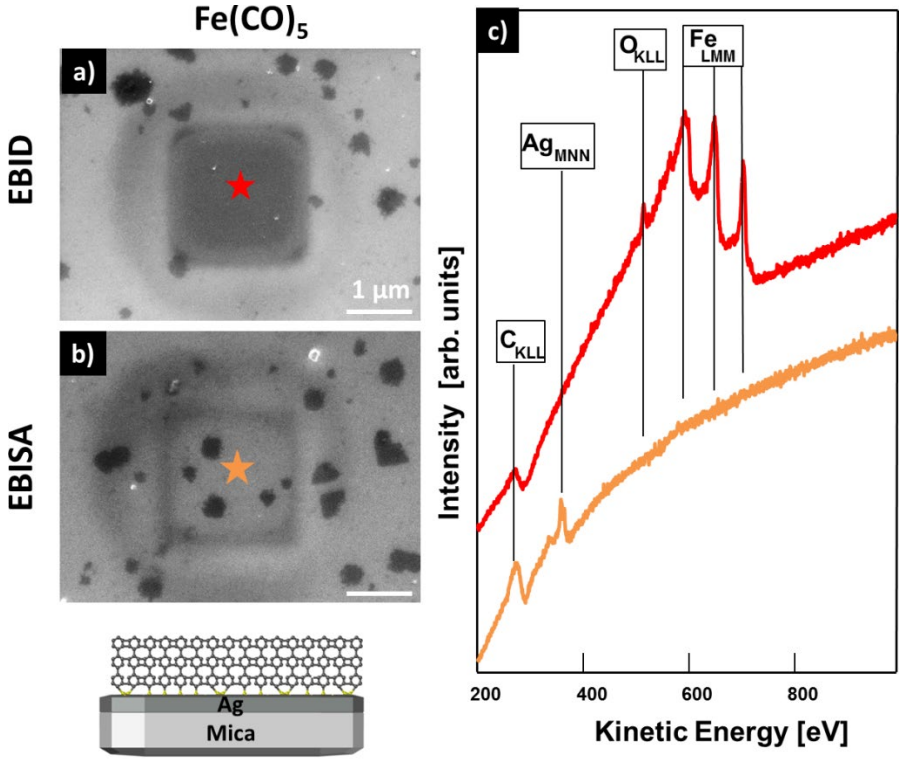

Figure S2: Results of FEBIP experiments followed by autocatalytic growth on a CNM on Ag(111)/mica. All structures were written with E_{beam} = 15 kV and I_{beam} = 3 nA. (a) SEM image of a 2 × 2 µm^2 deposit fabricated via EBID + AG with $Fe(CO)_5$ (7.8 C/cm^2 and t_{AG} = 3 h 38 min). (b) SEM image of a 2 × 2 µm^2 deposit fabricated via EBISA + AG with $Fe(CO)_5$ (7.8 C/cm^2 and t_{AG} = 4 h 2 min). (c) Local AE spectra recorded at the positions indicated with the correspondingly colored stars.

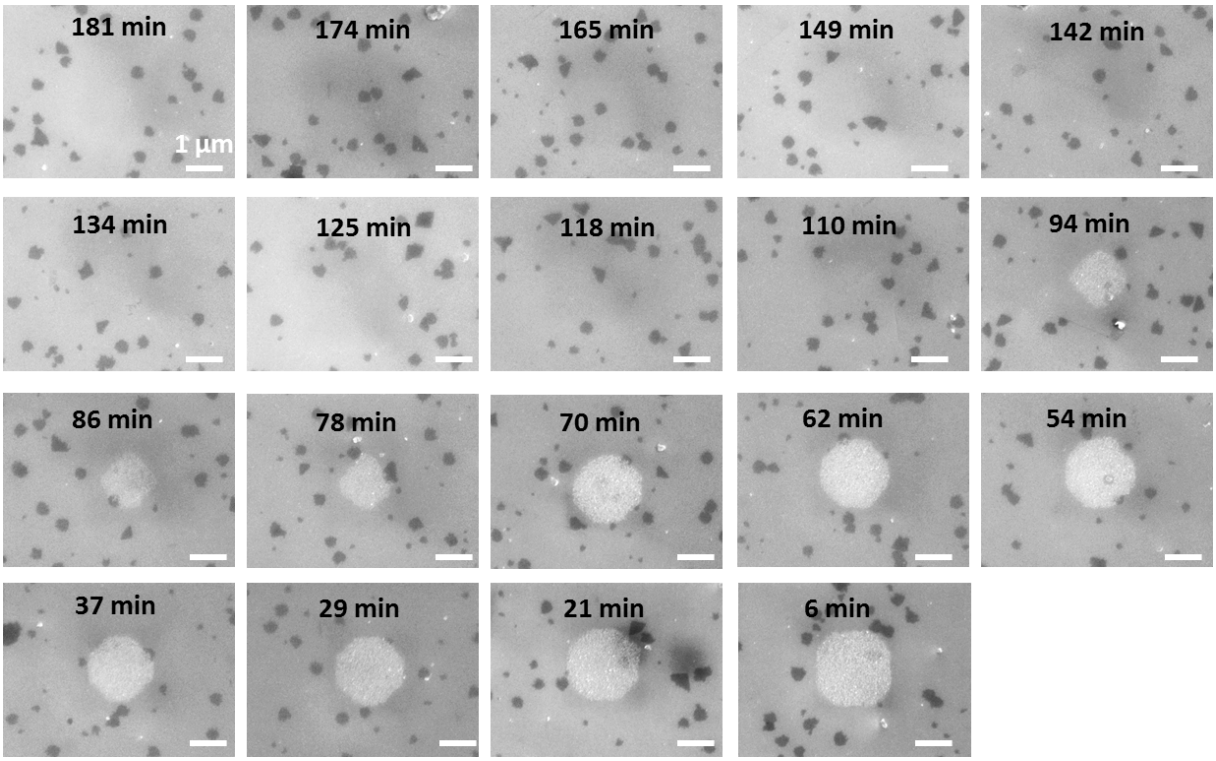

Figure S3: Results of time-dependent EBISA experiments followed by autocatalytic growth on a TPT SAM on Ag(111)/mica. All structures were written with E_{beam} = 15 kV, I_{beam} = 3 nA, and the same t_{AG} = 3 h 29 min. SEM images of 2 × 2 µm^2 deposits fabricated via EBISA + AG with $Fe(CO)_5$ (electron dose: 1.01 C/cm^2). The waiting time between electron irradiation and precursor dosage is indicated for each structure.

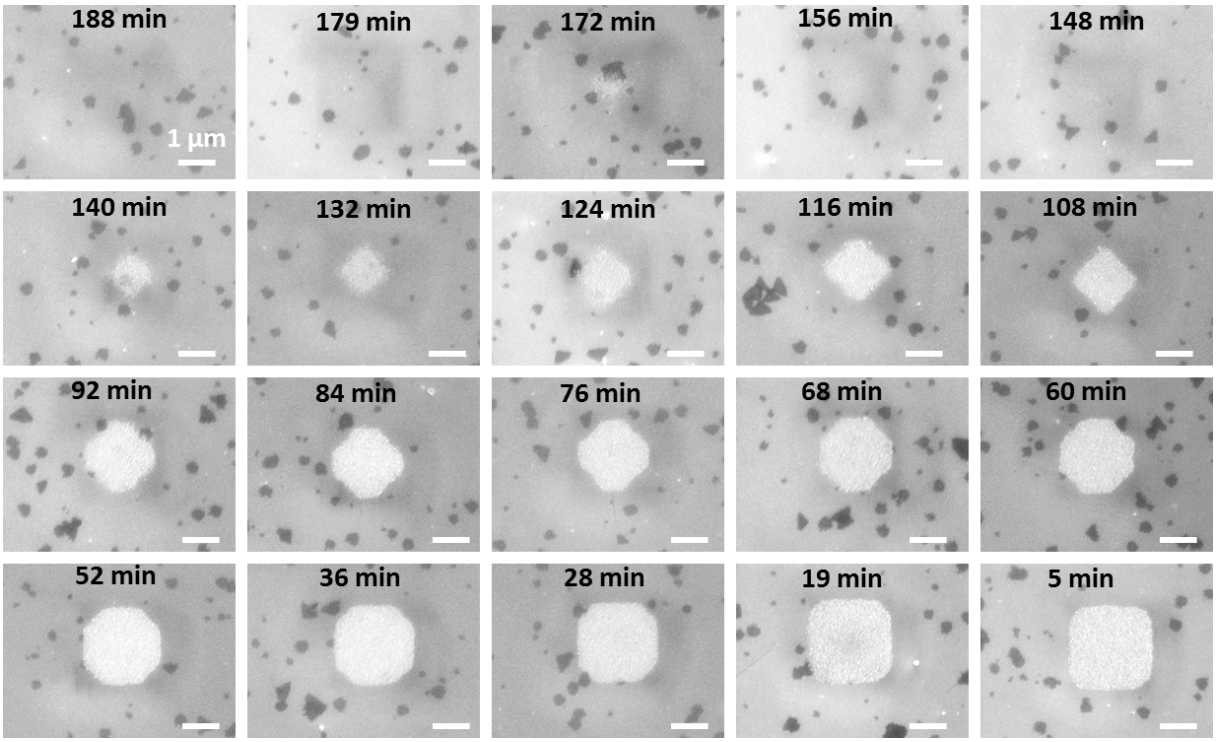

Figure S4: Results of time-dependent EBISA experiments followed by autocatalytic growth on a TPT SAM on Ag(111)/mica. All structures were written with E_{beam} = 15 kV, I_{beam} = 3 nA, and the same t_{AG} = 3 h 29 min; SEM images of 2 × 2 µm^2 deposits fabricated via EBISA + AG with $Fe(CO)_5$ (electron dose: 3.12 C/cm^2). The waiting time between electron irradiation and precursor dosage is indicated for each structure.

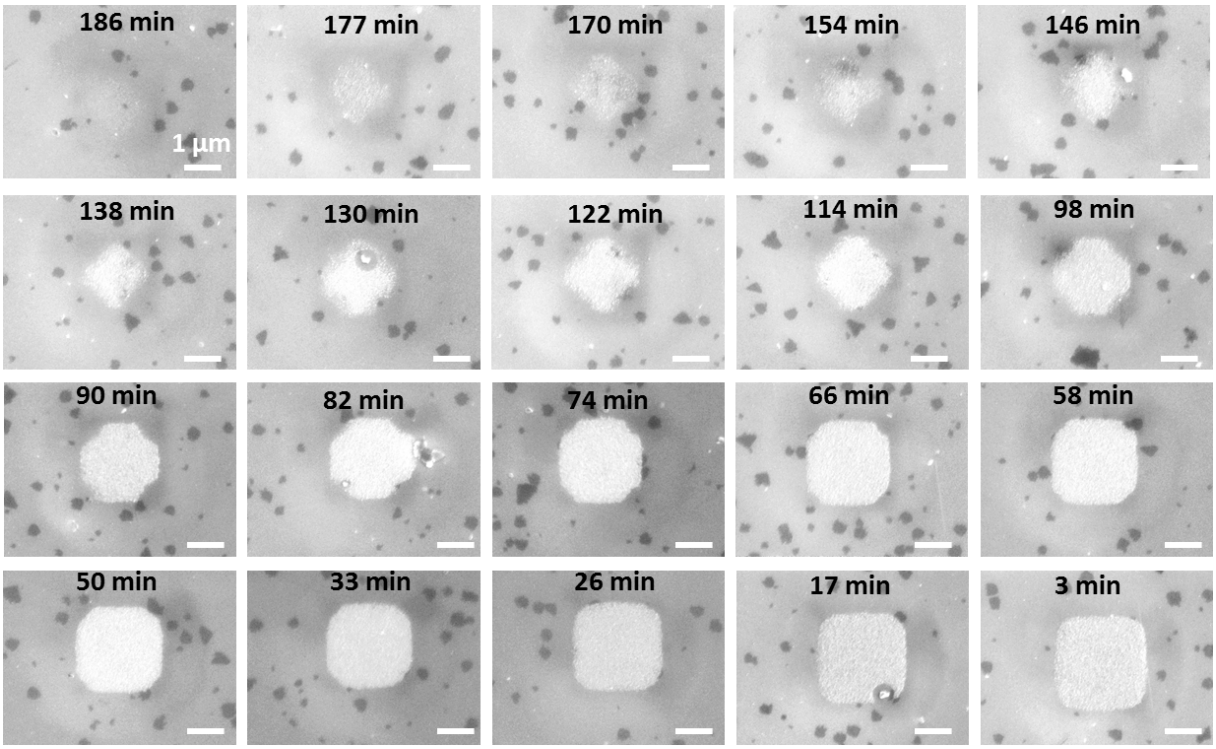

Figure S5: Results of time-dependent EBISA experiments followed by autocatalytic growth on a TPT SAM on Ag(111)/mica. All structures were written with E_{beam} = 15 kV, I_{beam} = 3 nA, and the same t_{AG} = 3 h 29 min. SEM images of 2 × 2 µm^2 deposits fabricated via EBISA + AG with $Fe(CO)_5$ (electron dose: 6.08 C/cm^2). The waiting time between electron irradiation and precursor dosage is indicated for each structure.

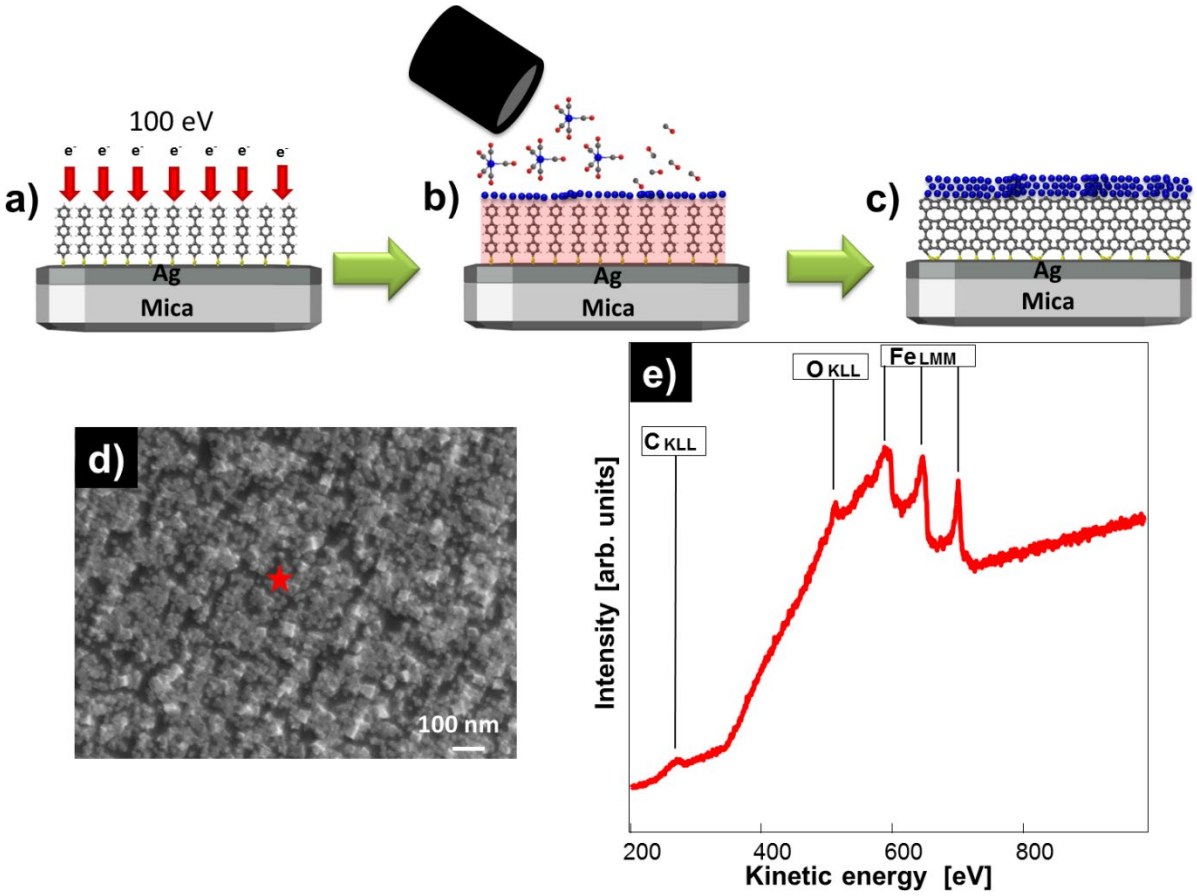

Figure S6: EBISA-like process with low-energy electrons. (a) Irradiation of a TPT SAM on Ag(111)/mica (100 eV; 120 mC/cm^2) by a flood gun. (b) Dosage of the $Fe(CO)_5$ precursor for 4 h. The active species in the SAM are indicated by the red rectangle. (c) Cross-linked CNM with Fe nanocrystals on top. (d) SEM image of the cross-linked CNM with Fe nanocrystals on top. (e) Local AE spectrum recorded at the position indicated by the colored star.

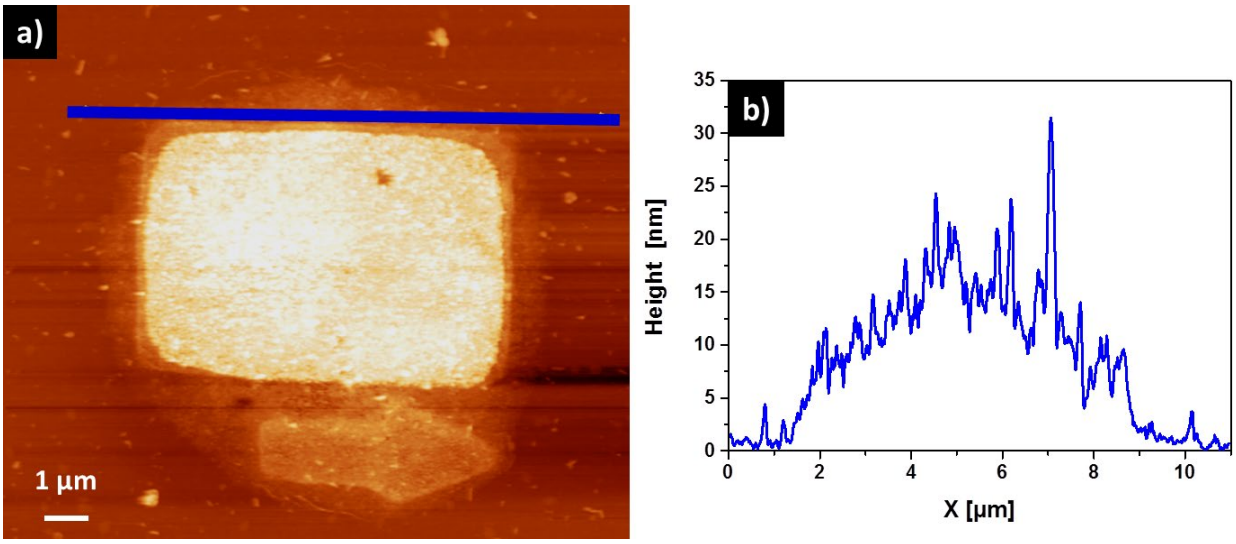

Figure S7: (a) AFM image of the Fe structure shown in Figure 4c of the main manuscript. (b) Height profile of the bright circular feature around the Fe structure

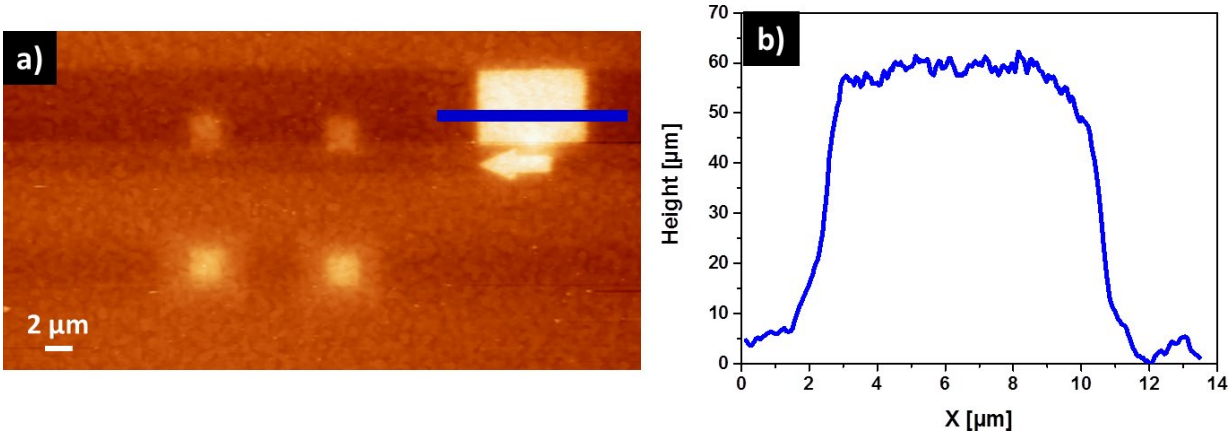

Figure S8: (a) AFM image of five different cobalt oxide structures before the transfer process. (b) Height profile of the large marker structure