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 $E_{\text{beam}} = 15$ kV and $I_{\text{beam}} = 3$ nA. (a) SEM image of a $2 \times 2 \mu m^2$ deposit fabricated via EBID + AG with Fe(CO)$_5$ (4.7 C/cm$^2$ and $t_{\text{AG}} = 2$ h 26 min). (b) SEM image of a $2 \times 2 \mu m^2$ deposit fabricated via EBISA + AG with Fe(CO)$_5$ (10.1 C/cm$^2$ and $t_{\text{AG}} = 2$ h 41 min). (c) SEM image of a $2 \times 2 \mu m^2$ deposit fabricated via EBID + AG with Co(CO)$_3$NO (4.7 C/cm$^2$ and $t_{\text{AG}} = 2$ h 24 min). (d) SEM image of a $2 \times 2 \mu m^2$ deposit fabricated via EBISA + AG with Co(CO)$_3$NO (10.1 C/cm$^2$ and $t_{\text{AG}} = 2$ 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 $E_{\text{beam}} = 15$ kV and $I_{\text{beam}} = 3$ nA. (a) SEM image of a 2 × 2 µm² deposit fabricated via EBID + AG with Fe(CO)$_5$ (7.8 C/cm² and $t_{\text{AG}} = 3$ h 38 min). (b) SEM image of a 2 × 2 µm² deposit fabricated via EBISA + AG with Fe(CO)$_5$ (7.8 C/cm² and $t_{\text{AG}} = 4$ 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 $E_{\text{beam}} = 15$ kV, $I_{\text{beam}} = 3$ nA, and the same $t_{\text{AG}} = 3 \text{ h 29 min}$. SEM images of $2 \times 2 \text{ µm}^2$ deposits fabricated via EBISA + AG with Fe(CO)$_5$ (electron dose: $1.01 \text{ C/cm}^2$). 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 $E_{\text{beam}} = 15$ kV, $I_{\text{beam}} = 3$ nA, and the same $t_{\text{AG}} = 3 \text{ h } 29 \text{ min}$; SEM images of 2 × 2 μm² deposits fabricated via EBISA + AG with Fe(CO)$_5$ (electron dose: 3.12 C/cm²). 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 $E_{\text{beam}} = 15$ kV, $I_{\text{beam}} = 3$ nA, and the same $t_{\text{AG}} = 3$ h 29 min. SEM images of $2 \times 2$ 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/cm²) 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.