Supporting Information (SI)

Freestanding Carbon Nanomembranes and Graphene Monolayers Nanopatterned via EUV Interference Lithography

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Figure S1. Raman spectrum ($\lambda=532$ nm) of CVD grown graphene after the transfer onto a silicon oxide substrate. The G peak at 1591 cm$^{-1}$, 2D peak at 2686 cm$^{-1}$ and a small D peak at 1347 cm$^{-1}$ are present. The D/G ratio of 0.10 refers to a small amount of defects after the transfer. The 2D/G ratio of 2.4 is typical for this type of graphene preparation.
**Figure S2.** HIM image of a freestanding layered structure of CNM nanoribbons forming a 2D network. The structure was prepared by subsequent transfer of two rows of CNM nanoribbons. The nanoribbons are 20±5 nm wide, while the mesh has a width of approximately 200 nm × 400 nm.
Figure S3. HIM image of garland-like structures resulting from the overexposure with a 2D mask. The CNM garland with only 10 nm wide connections demonstrates a remarkable stability as a free-standing structure.
Table S1. Overview of the doses for the optimized pattern transfer into SAMs and CNMs.

| Pattern                  | Typical dose for direct crosslinking | Typical dose for resist-based nanopatterning |
|--------------------------|--------------------------------------|---------------------------------------------|
| 125 nm nanoribbons      | 200 J/cm²                            | 200 mJ/cm²                                  |
| 140 x 145 nm holes      | 80 J/cm²                             | 80 mJ/cm²                                   |
| 45 x 50 nm dots         | 150 J/cm²                            | 100 mJ/cm²                                  |
| 350 x 354 nm holes      | 80 J/cm²                             | 20 mJ/cm²                                   |
| 200 x 225 nm holes      | 50 J/cm²                             | 30 mJ/cm²                                   |
| 50 nm nanoribbons       | not successful                       | 1300 mJ/cm²                                 |