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Electronic supplementary information for "Nano-channels array etched in hexagonal boron nitride meso-membranes by focused ion beam."

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- 1 h-BN film transfer
- 2 Evolution of the channels under air exposure

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1 h-BN film transfer

Following the same procedure described in the main article (CVD growth of hBN on copper foil, Cu etching, direct transfer on a substrate) but changing the substrate by a silicon chip, the hBN film obtained is continuos over milimeter range has shown in Fig.S1.



Figure S1 SEM image of h-BN film transferred on a Si substrate.

2 Evolution of the channels under air exposure

In order to asses the stability of the membranes, additionnal experiments have been performed. It has been recently suggested ¹ that h-BN may not be stable in the presence of metal when exposed to air. As Ga contamination may be a concern while using FIB as a patterning technique, we evaluated Ga contents near the holes using energy dispersive X-ray spectroscopy (EDS) and performed electron microscopy images of the membrane before and after air exposure (see Fig. S2).

The EDS spectra suggests traces (0.1-0.5 Atomic percent) of Ga contaminants. Nevertheless, after three month of air exposure, a slight increase of the diameter of the holes can be detected that do not exceed few nanometers (see Fig. S2). This phenomenon is probably related to Ga contamination. But this evolution is probably not linear with time and is limited by the Ga contents, a solution to this slight evolution may be solved by using focused He beam.



Figure S2 Evolution of the holes after air exposure. (a) SEM image taken immediately after etching of the channels (no air exposure). TEM image taken after (b) 4 days and (c) 3 month of air exposure. (d-e) Zoom of the TEM images of the holes highlighted in (b) and (c). (f) EDS spectrum acquired during electron exposure in the area shown in the inset.

References

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