# 30 June 2016

**Miling of Chromium coated SiN membrane.  
Piercing through the membrane with different doses**

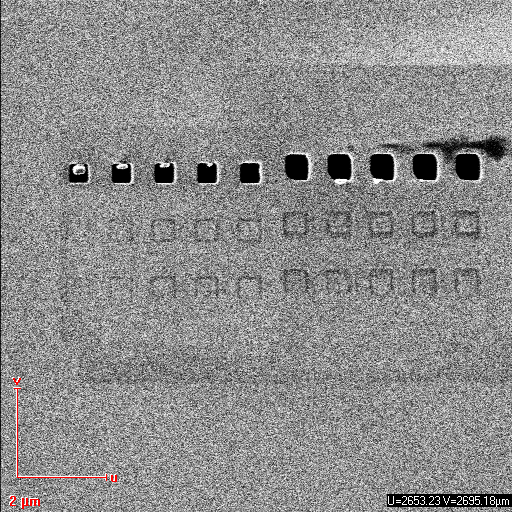
**11:30**

**Parameters :**

|  |  |
| --- | --- |
| Coating | 5 nm Cr |
| Thickness | 5 + 100 nm |
| Beam | 35kV 20µm (8) 6.0pA |
| Measured current | 6.75 then 6.97 pA |
| Loop Factor | 20 |
| Line Dose | 1000 then 3000 µC/cm |
| Dot dose | 0.10044 then 0.8 pC |
|  |  |
| Design | *Multiple fall* |
| Design Dose factor | *1* |

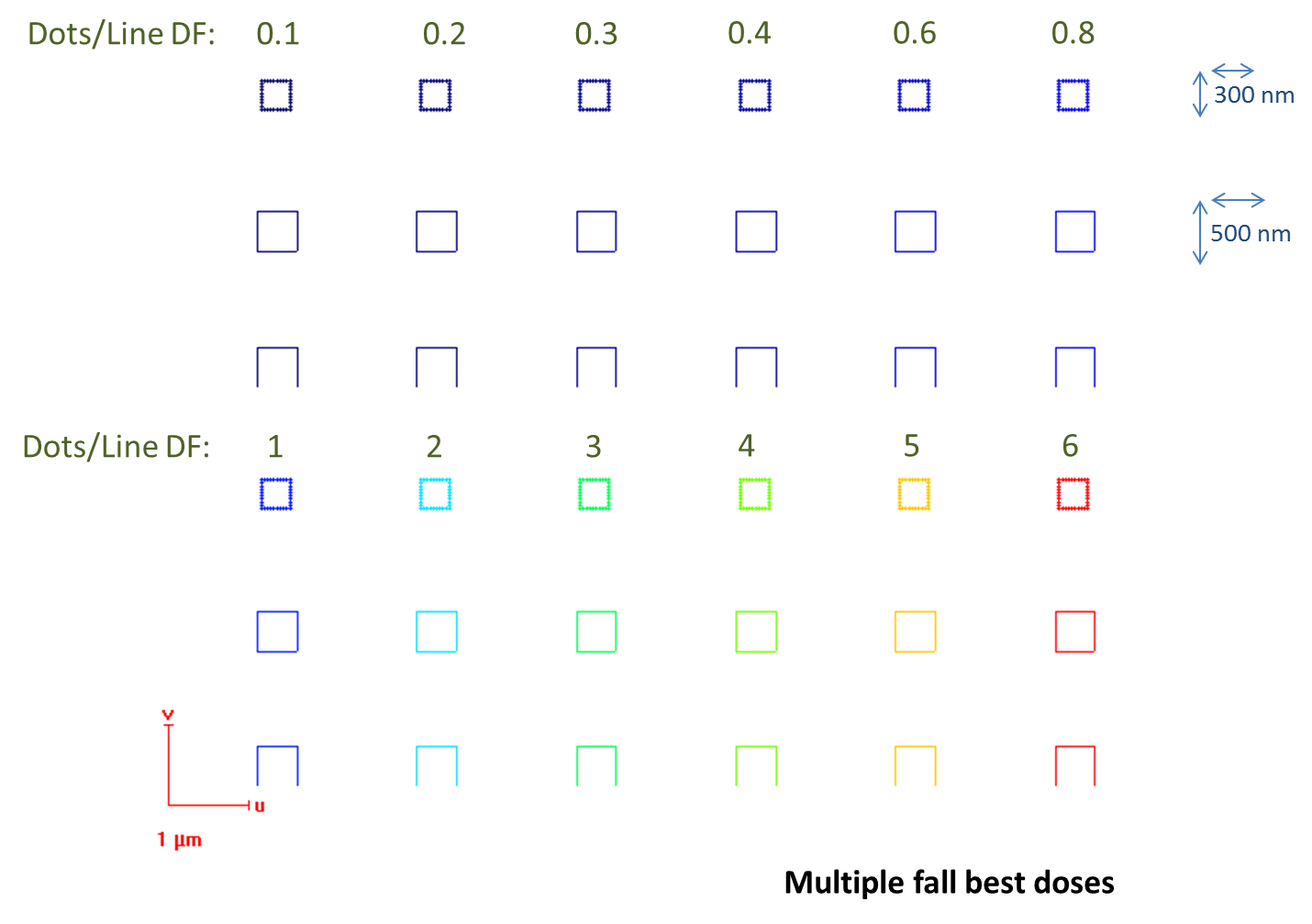
**Experiment and Results:**

Left: Line dose 1000 and Dot dose 0.10044  
Right: Line dose 3000 and Dot dose 0.8  
From left to right: dose factor 1 to 1.8 (step: 0.2)



A dose of 20\*0.10044\*1=**2.0088pC** is enough to pierce through the membrane with dots. For low doses a part of the membrane seems to hold on to a border:  


Concerning lines, a dose of 1.8\*20\*3000µC\*0.0032=**345.6µC** is not enough to pierce through the membrane.

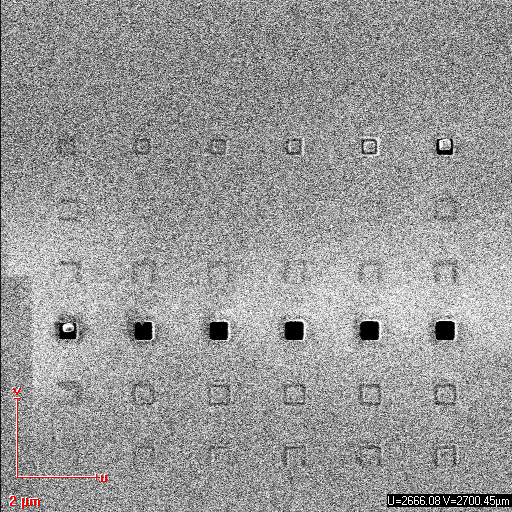
***To bring forward the importance of doses, we will use a new design:*** *multiplefall-bestdoses* ***composed of dose factors: 0.1; 0.2; 0.3; 0.4; 0.6; 0.8 on a first line, and 1 to 6 on a second line:***

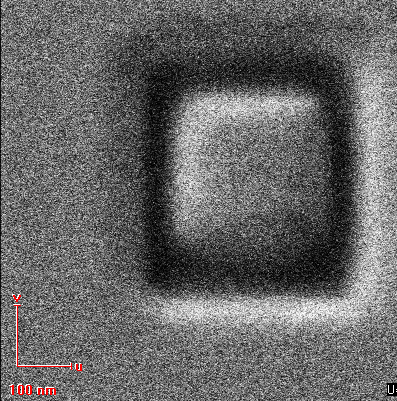
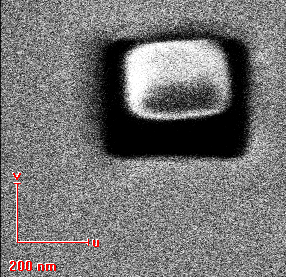
**12:15**

**Parameters :**

|  |  |
| --- | --- |
| Coating | 5 nm Cr |
| Thickness | 5 + 100 nm |
| Beam | 35kV 20µm (8) 6.0pA |
| Measured current | 6.83 pA |
| Loop Factor | 20 |
| Line Dose | 1000 µC/cm |
| Dot dose | 0.1 pC |
|  |  |
| Design | *Multiple fall best doses* |
| Design Dose factor | *1* |

**Experiment and Results:**



The dot at dose factor 0.6 does not pierce the membrane, contrarily to the dot at 0.8:  
 

Therefore, the limit dot dose to pierce through the membrane is supposed to be between 20\*0.1\*0.6=**1.2pC** and **1.6pC.** Moreover a line dose of 20\*1000\*6\*0.0032=**384µC** is not enough.

**Parameters :**

|  |  |
| --- | --- |
| Measured current-pA | 6.978 |
| Loop Factor | 20 |
| Dot Dose-pC | 0.1 |
| Line Dose-µC/cm | 1000 |
| Area Dose | 1000 |
|  |  |
| Design | *Fptriangle2* |
| Design Dose factor | *1* |

**Experiment and Results:**

**Parameters :**

|  |  |  |
| --- | --- | --- |
| Measured current-pA | 6.832 | 6.846 |
| Loop Factor | 20 | 20 |
| Dot Dose-pC | 0.1 | 0.08 |
| Line Dose-µC/cm | 5000 | 7000 |
| Area Dose | 1000 | 1000 |
|  |  |  |
| Design | *Multiple fall best doses* | *Multiple fall best doses* |
| Design Dose factor |  | *1* |

**Experiment and Results:**

**Parameters :**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Measured current-pA | 6.953 | 6.992 | ~6.99 | 6.99 |
| Loop Factor | 20 | 20 | 20 | 200 |
| Dot Dose-pC | 0.08 | 0.08 | 0.1 | 0.01 |
| Line Dose-µC/cm | 7000 | 35000 | 20000 | 1800 |
| Area Dose | 1000 | 1000 | 1000 | 100 |
|  |  |  |  |  |
| Design | *Fp rectangle* | *Fp rectangle* | *Fp rectangle* | *Fp rectangle* |
| Design Dose factor | *1* | *1* | *1* | *1* |

**Experiment and Results:**

**Parameters :**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Measured current-pA |  |  |  | 7.027 |
| Loop Factor |  |  |  | 1 |
| Dot Dose-pC |  |  |  | 2.0088 |
| Line Dose-µC/cm |  |  |  | 20000 |
| Area Dose |  |  |  | 1000 |
|  |  |  |  |  |
| Design |  |  |  | *Resolution dots* |
| Design Dose factor |  |  |  | *1* |

**Experiment and Results:**

**Parameters :**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Measured current-pA |  |  |  | 7.148 |
| Loop Factor |  |  |  | 1 |
| Dot Dose-pC |  |  |  | 2.0088 |
| Line Dose-µC/cm |  |  |  | 20000 |
| Area Dose |  |  |  | 1000 |
|  |  |  |  |  |
| Design |  |  |  | *Multiple fall best doses* |
| Design Dose factor |  |  |  | *1* |

**Experiment and Results:**