Quanta 3D FIB

APPLICATION NOTE | 30kV vs 16kV Final Thinning

The question of sample damage by the Ion beam comes up frequently during FIB preparation. While most users use 30kV for the entire process, figure 1 shows that by reducing the voltage you can significantly reduce the amount of damage to your sample. Most users believe that by reducing the voltage by half will double the polishing time. The sample in figure 2 shows both preparation of a Si sample at 30kV and 16kV with the time taken listed in figure 3. As you can see there is very little difference between the total times.

Note that the one prepared at 16kV looks more even and more transparent. All patterns were run using the Si H C recipe and the size of the windows were kept to 5um while the Y may have varied some. Both windows were finished with a 5kV cleaning at ±3 degrees for 2 min on each side.

As you can see from the table at the bottom of the page the actual time is less for the 16kV sample. It is not clear why the discrepancy in time but it should be at least worth a try for your next sample.

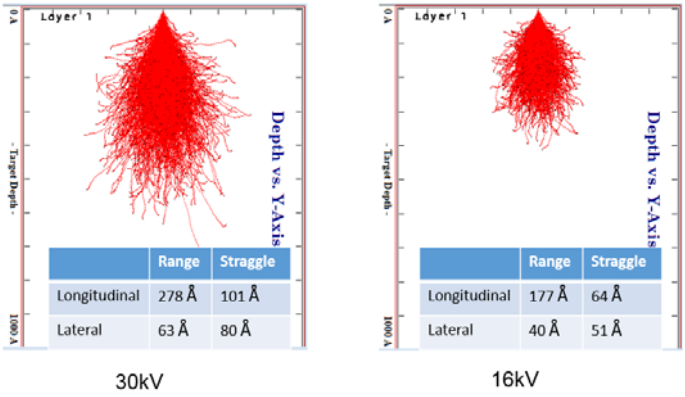

Figure 1 SRIM simulations showing total extent of ion penetration for 30kV and 16kV Ga ions in Si.

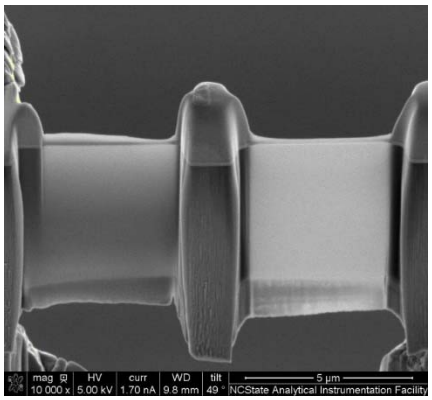

Figure 2 Ebeam image of samples prepared at 30kV (left) and 16kV (right).

30kV

Curr (nA)	Profile	Depth (um)	Tilt	Time (m:s)
0.5	CCS	2	± 2	2:04
0.3	CCS	2	± 2	4:28
0.1	Rec	2	± 2	14:58
0.05	Rec	3	0	8:00
Total Time				**30:00**

16kV

Curr (nA)	Profile	Depth (um)	Tilt	Time (m:s)
0.5	CCS	3	± 2	4:54
0.25	CCS	3	± 2	5:04
0.15	Rec	3	± 2	6:00
Total Time				**15:58**

Figure 3 Chart showing the time required to perform removal Si at 30kV and 16kV.

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