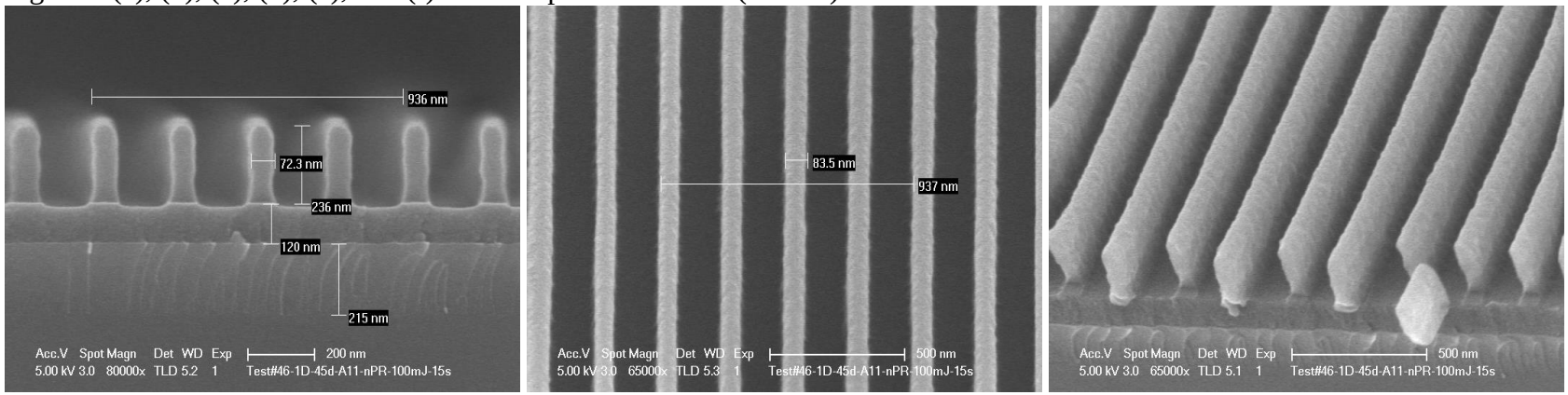
Laser Interference Lithography (Holography)

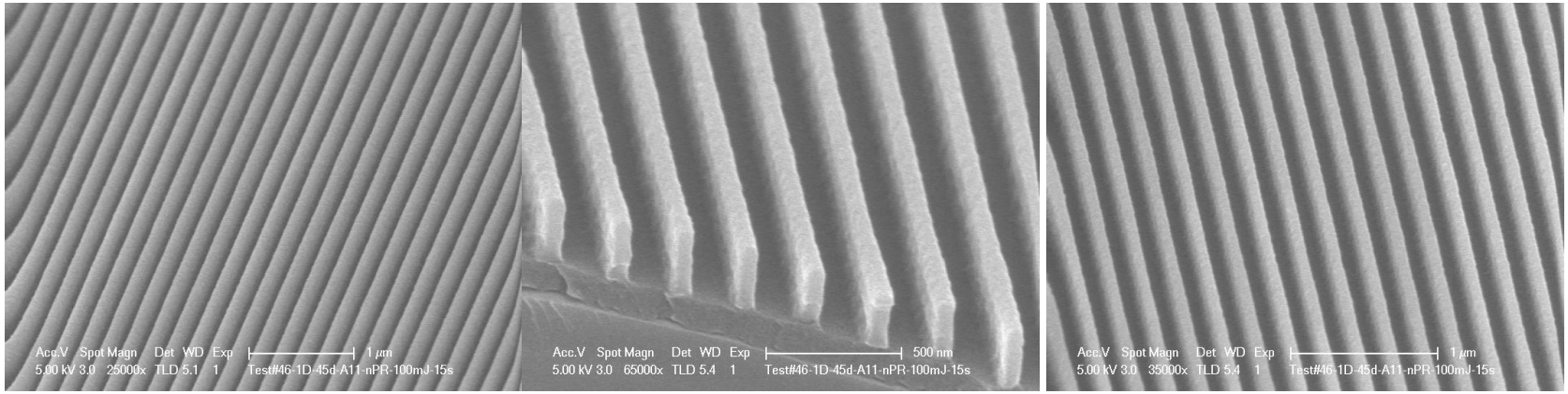
1-D Line Gratings: Process Details of the holographic 1D-line pattern (210nm thick SiO2 deposited on Si; the angle between sample surface and reflective mirror $\theta=45^{o}$)

1 Cleaning sample(s) with acetone (2min.) and methanol (1min.) in ultrasonic bath, then, DI-water rinse and N2 blow-dry
2 Dehydration at 115C for 10min.
3 Spin-on XHRiC-11 (ARC) at 3000 rpm for 30sec
4 Bake at 175C for 1min.
5 Waiting for 2min.
6 Spin-on THMR-IP3600HP-D resist at 5000rpm for 30sec
7 Bake at 90C for 90sec
8 Exposing the resist with an energy dose of 100mJ
9 Post-exposure-bake (PEB) at 115C for 120sec
10 Developing the resist in AZ300MIF developer for 15 sec, then, DI-water rinse (small DI water flow) and N2 blow-dry (small gun pressure, less than 20psi)
11 O2 plasma descum with 300mT/100W for 20sec

Figure 1 (a), (b), (c), (d), (e), and (f): 1D line pattern on SiO2(216nm)/Si.



Test#46A-(a) (b) (c)



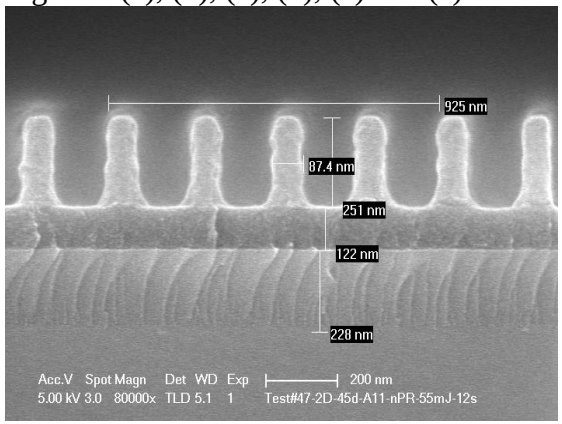
Test#46A-(d) (e) (f)

Note: the thickness of XHRiC-11 is ~120nm with the spin-on speed of 3000rpm and the pitch of the line period is ~234nm.

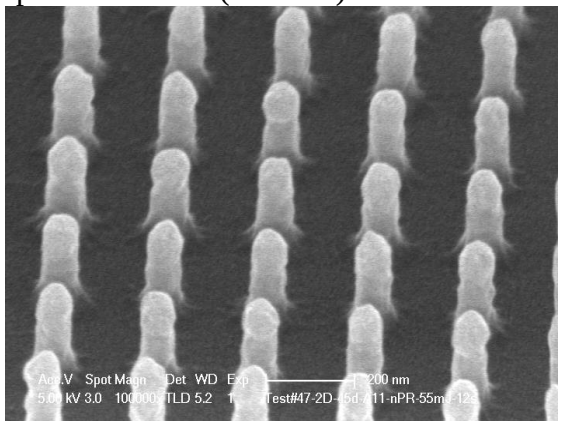
2-D Square Dot Arrays: Process Details of the holographic 2D-dot pattern (~216nm thick SiO2 deposited on Si; $\theta=45^{o}$ for holography set-up)

1 Cleaning sample(s) with acetone (2min.) and methanol (1min.) in ultrasonic bath, then, DI-water rinse and N2 blow-dry
2 Dehydration at 115C for 10min.
3 Spin-on XHRiC-11 (ARC) at 3000 rpm for 30sec
4 Bake at 175C for 60sec
5 Waiting for 2min.
6 Spin-on THMR-IP3600HP-D resist at 5000rpm for 30sec
7 Bake at 90C for 90sec
8 Exposing the resist with an energy dose of 55mJ (twice for 2D-dot pattern with the sample orientation rotated 90^{o})
9 Post-exposure-bake (PEB) at115C for 120sec (then, waiting for 2 min.)
10 Developing the resist in AZ300MIF developer for 12 sec, then, DI-water rinse (small DI water flow) and N2 blow-dry (small gun pressure, less than 20psi)
11 O2 plasma descum with 300mT/100W for 20sce

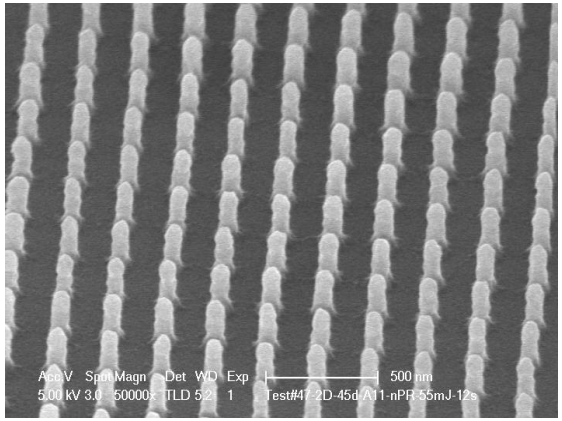
Figure 2 (a), (b), (c), (d), (e) and (c): 2D dot pattern on SiO2(~216nm)/Si.



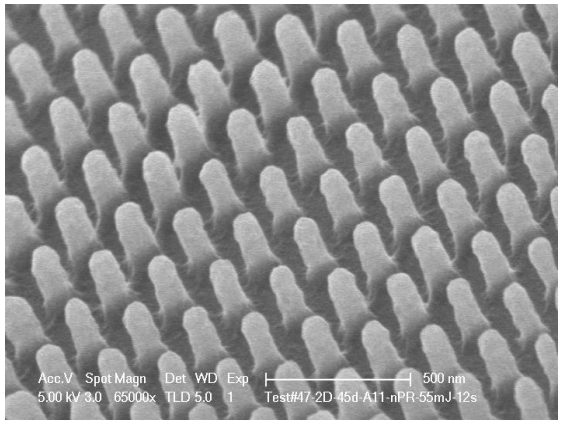
Test#47A-(a)



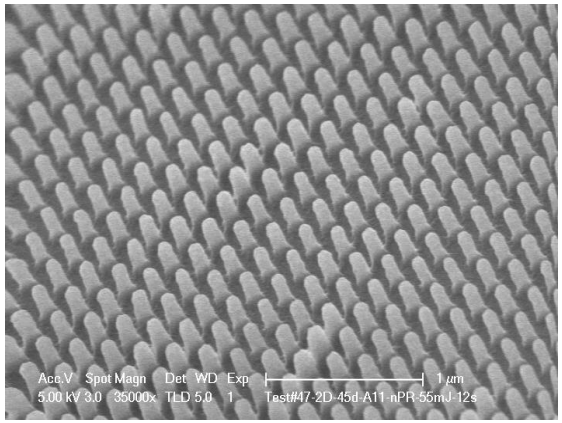
(b)



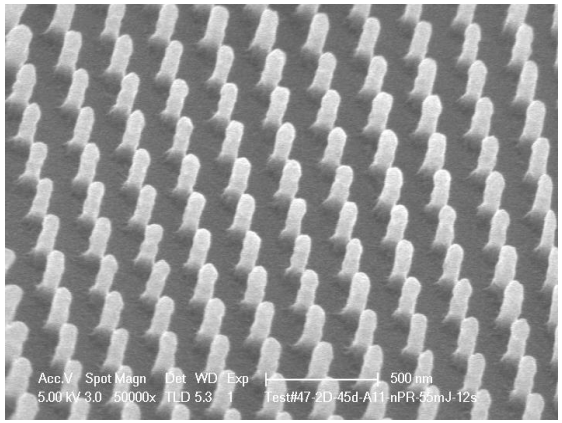
(c)


Acc.V Spot Magn Det WD Exp 500 nm
5.00 kV 3.0 65000x TLD 5.0 1 Test#47-2D-45d-A11-nPR-55mJ-12s

(d)


Acc.V Spot Magn Det WD Exp 1 µm
5.00 kV 3.0 35000x TLD 5.0 1 Test#47-2D-45d-A11-nPR-55mJ-12s

(e)


Acc.V Spot Magn Det WD Exp 500 nm
5.00 kV 3.0 50000x TLD 5.3 1 Test#47-2D-45d-A11-nPR-55mJ-12s

(f)