Photolithography of SU8-2015

Objective: To set up photolithography process of SU8-2015.

Experimental:

1)Sample (Si pieces) preparation: a) Soaking in acetone (2') and methanol (2') in ultrasonic bath, then, DI water rinse and nitrogen gas dry; b) Soaking in RCA-1, NH4OH:H2O2:H2O (1:1:5), at 90°C for 22 minutes, then, DI water rinse and nitrogen gas dry; c) Oxygen plasma treatment to make surface hydrophobic (PEII): 300mT/100 W for 30"; d) Dehydration bake at 200°C for 15 minutes (let it cool down on metal surface for 5 minutes).

2) Lithography:
a) Spin-on HMDS. 2500 rpm for 30".
b) Spin-on SU8-2015. Two steps: first one: 500 rpm with 100 rpm/s ramp for 8"; second one: 2500rpm with 300 rpm/s for 30".
c) Soft bake at 95°C for 3.5 minutes, then, let it cool down on cleanroom paper for 5 minutes.
d) Resist bead removal using acetone and Q-tip.
e) Resist expose using MA-6, mask with 12μm-ridge-lines, and a UV Filter (HOYA UV-34, 200-750 nm): cutting the transmission off by 50% at 350 nm.
f) Post expose bake at 95°C for 3.5 minutes, then, let it cool down on cleanroom paper for 5 minutes.
g) Development in SU8 developer: in the first developer bath for 160", then, in the second fresh developer bath for 20", then, rinse the sample with isopropanol and soak in isopropanol for 60", then, nitrogen gas dry.
h) Post development bake at 200°C for 15 minutes (to improve the resist adhesion on Si substrate).

Result and Discussion:
Table 1.

Sample #	Exposure Time (s)	Average Thickness (μm)	Average Opening Width (μm)	Average Lip Length (nm)
18	15	15.9	13.9	701
19	12	16.0	15.4	636

Figure 1 SU-8-2015 Resist Profile of Sample#18 (expose=15 s).

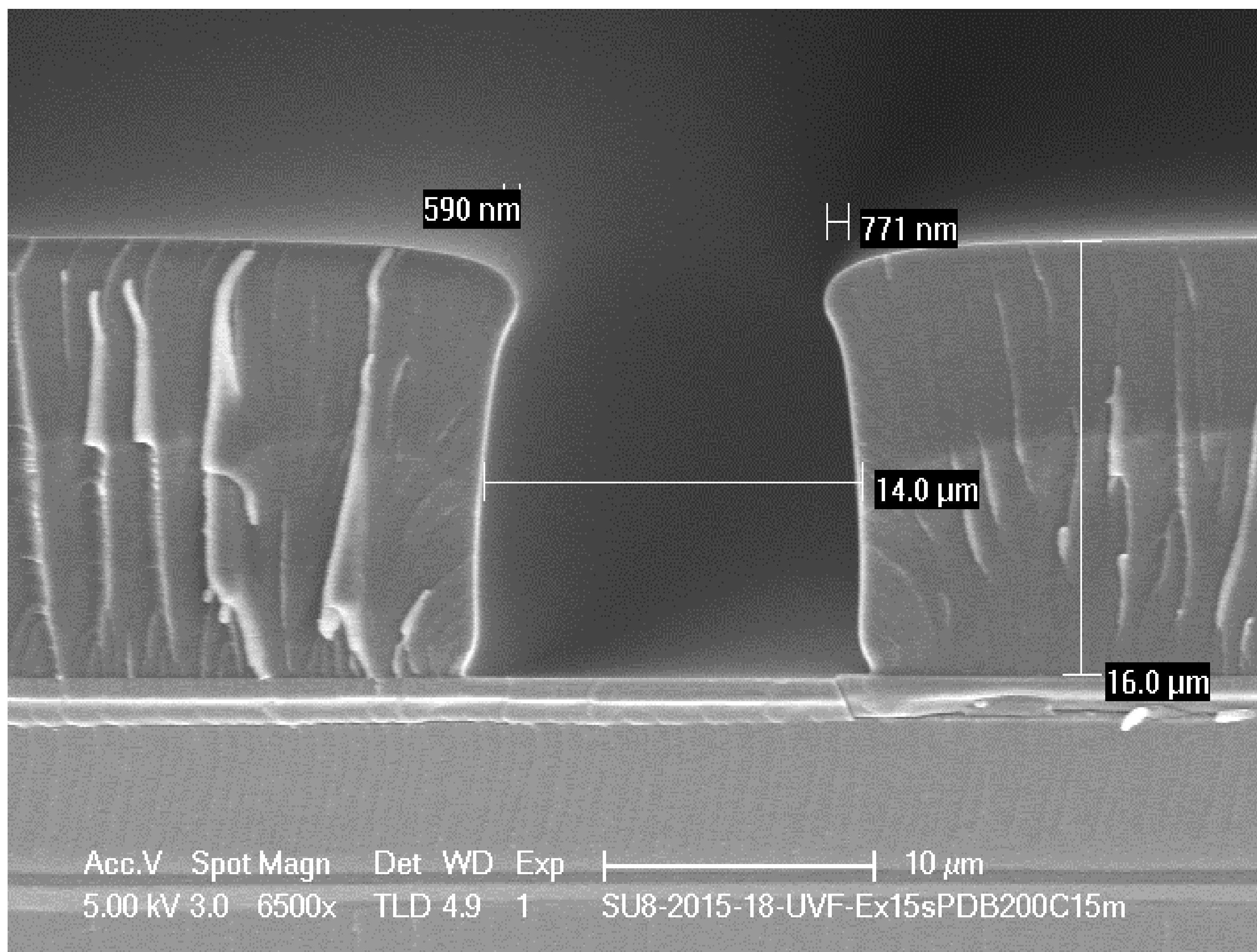

Figure 2 SU-8-2015 Resist Profile of Sample#19 (expose=12 s).