

## Single-Step Si Etch (not Bosch Process!) using DRIE

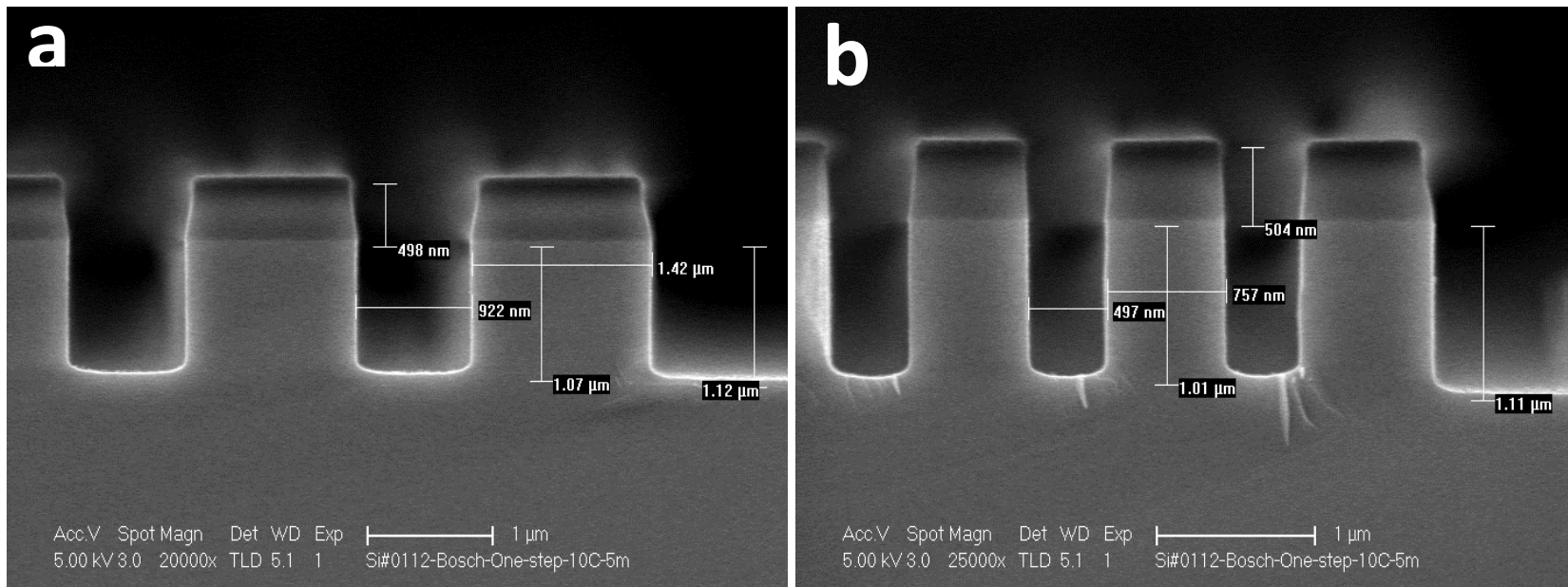
**Tool:** Si DRIE Etcher (Recipe Name: **cao\_n\_01**)

**Chuck Temperature:** 10 °C

**Recipe:** 19mT, 15/825W, SF<sub>6</sub>/C<sub>4</sub>F<sub>8</sub>/Ar Flow-rate=26/54/20SCCM.

Note: Before etching a Si sample, running an oxygen plasma clean of DRIE chamber, with 30mT, 0/825W, O<sub>2</sub>/Ar flow-rate=20/10sccm, for 30 minutes.

**Figure 1.** Si etch profile, using DRIE at 10 °C chuck temperature, with 19mT, 15/825W, SF<sub>6</sub>/C<sub>4</sub>F<sub>8</sub>/Ar flow-rate=26/54/20SCCM, and etch time of 5 minutes. (a) Trench width~0.9 $\mu$ m; (b) Trench width~0.5 $\mu$ m.



**Result:** a vertical side-wall etching profile. Etch Rate is  $\sim 0.2 \mu\text{m}/\text{min}$ , and the PR mask seems not to be etched at all [Etch selectivity (Si/PR) is very large!].

**Figure 2.** Si nanowire etch profile using DRIE at  $10^\circ\text{C}$  chuck temperature with 19mT, 15/825W,  $\text{SF}_6/\text{C}_4\text{F}_8/\text{Ar}$  flow-rate=26/54/20SCCM. (a)-(b) 130 s; (c)-(d) 180 s; (e)-(f) 240 s; (g)-(h) 300 s.

