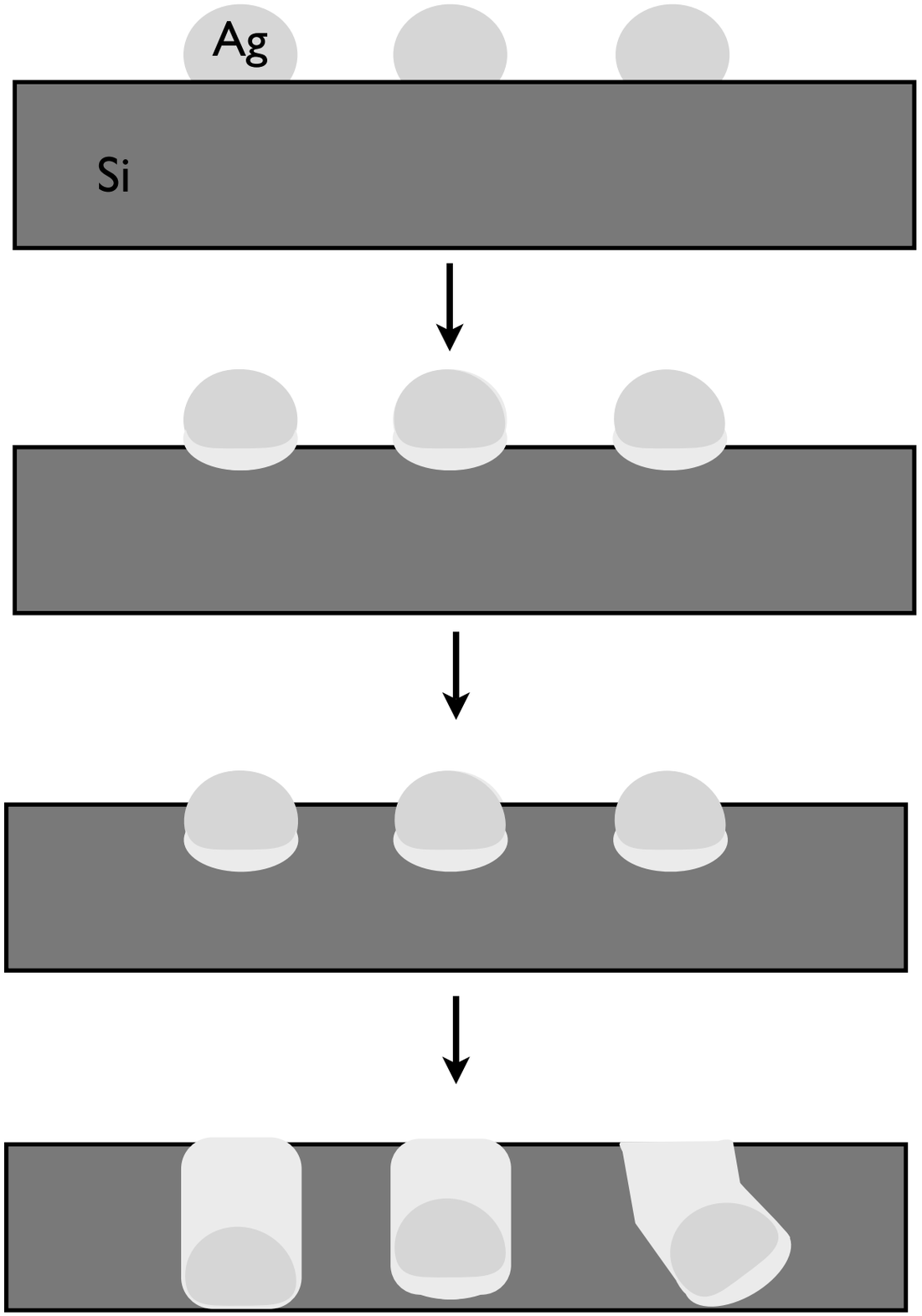
~200nm a-Si porous membrane

3-2-11



Ag is thermally evaporated on a-Si or c-Si and annealed to form "round" particles.

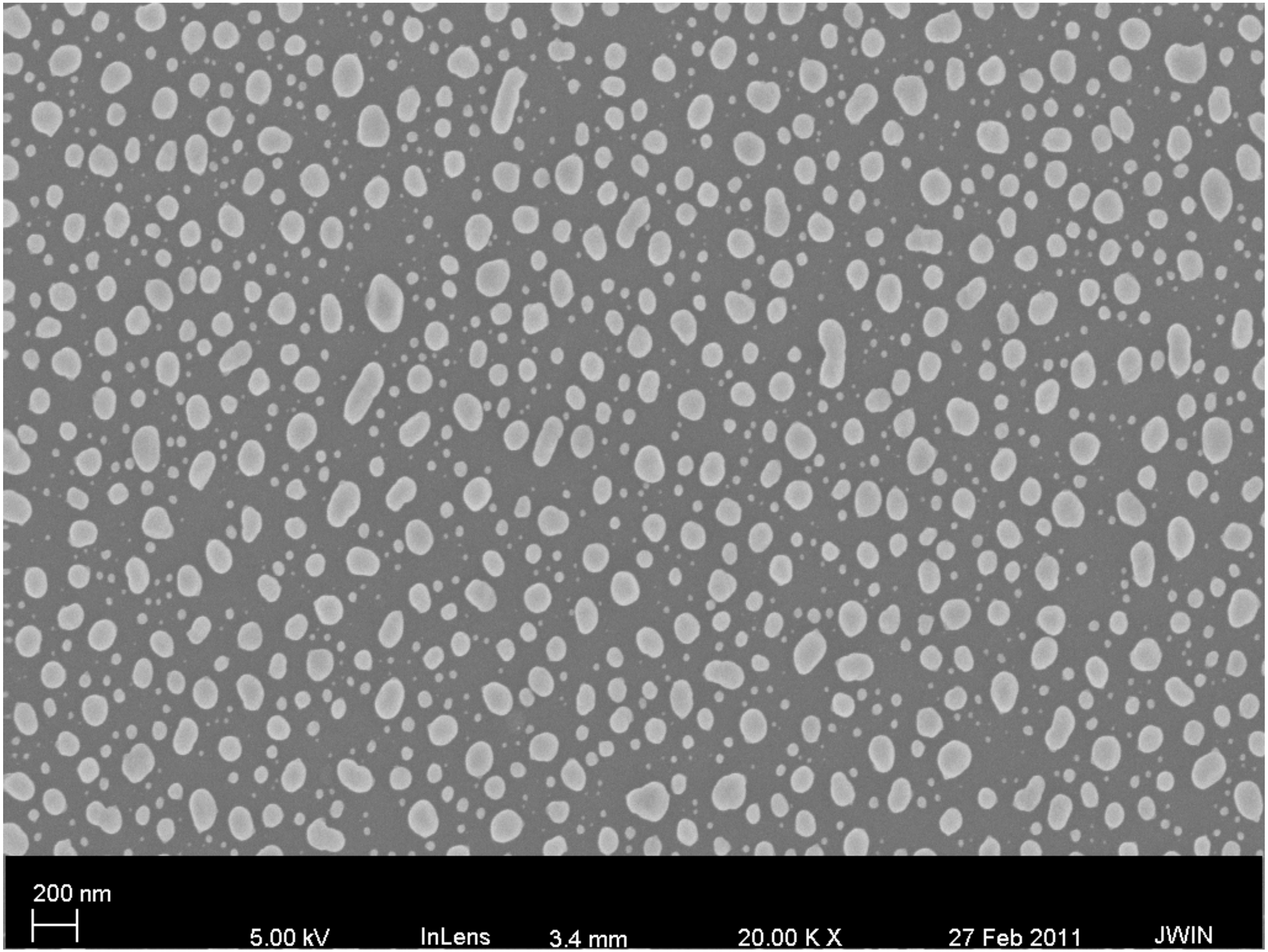
In a solution of HF and H_2O_2, the Ag catalyzes the oxidation of Si and HF quickly reacts with the oxide.

The Ag nanoparticles rapidly "burrow" through the silicon.

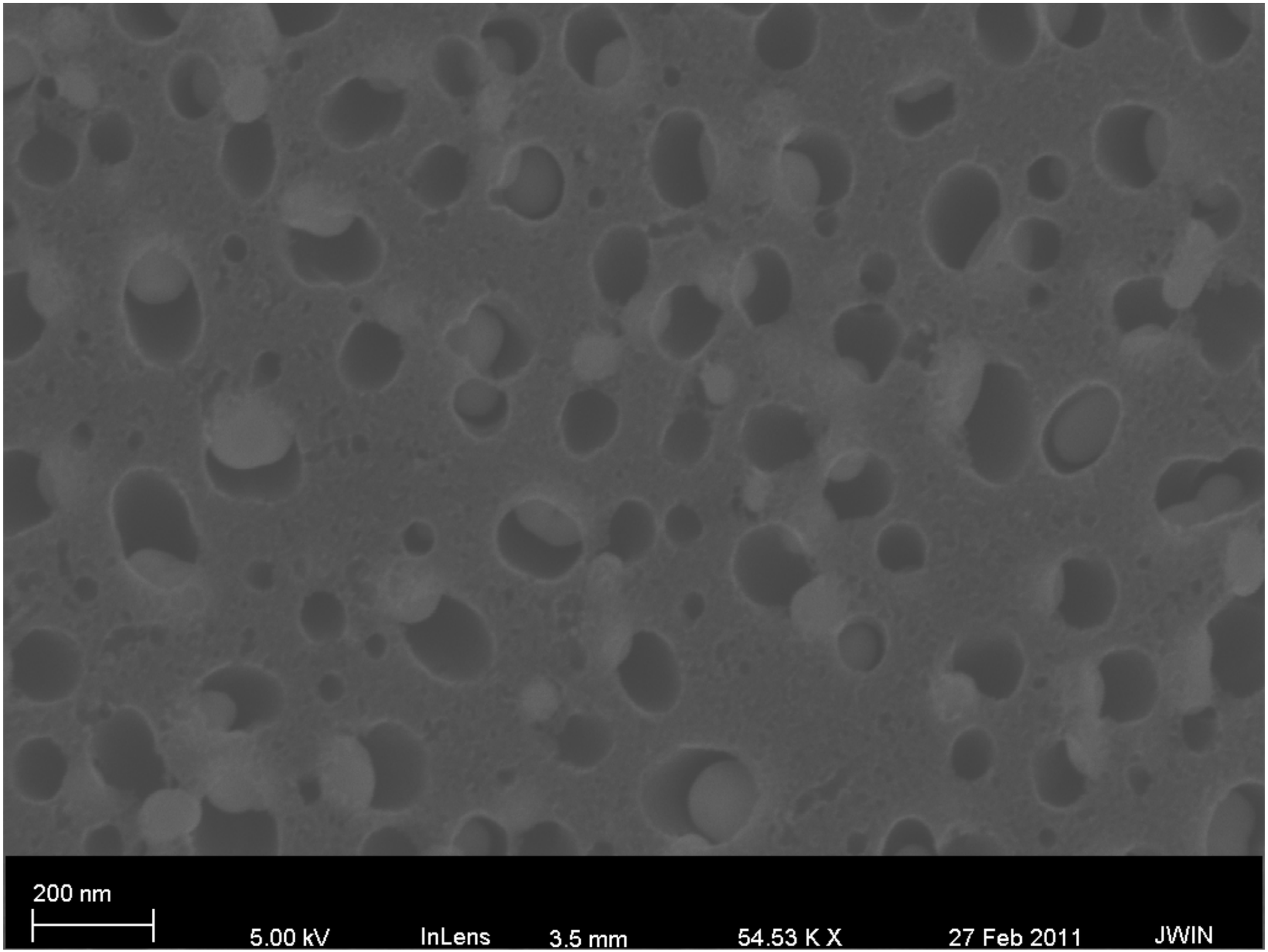
Tsujino and Matsumura. Boring deep cylindrical nanoholes in silicon using silver nanoparticles as a catalyst. Adv Mater (2005) vol. 17 (8) pp. 1045-+

Tsujino and Matsumura. Helical nanoholes bored in silicon by wet chemical etching using platinum nanoparticles as catalyst. Electrochem Solid St (2005) vol. 8 (12) pp. C193-C195

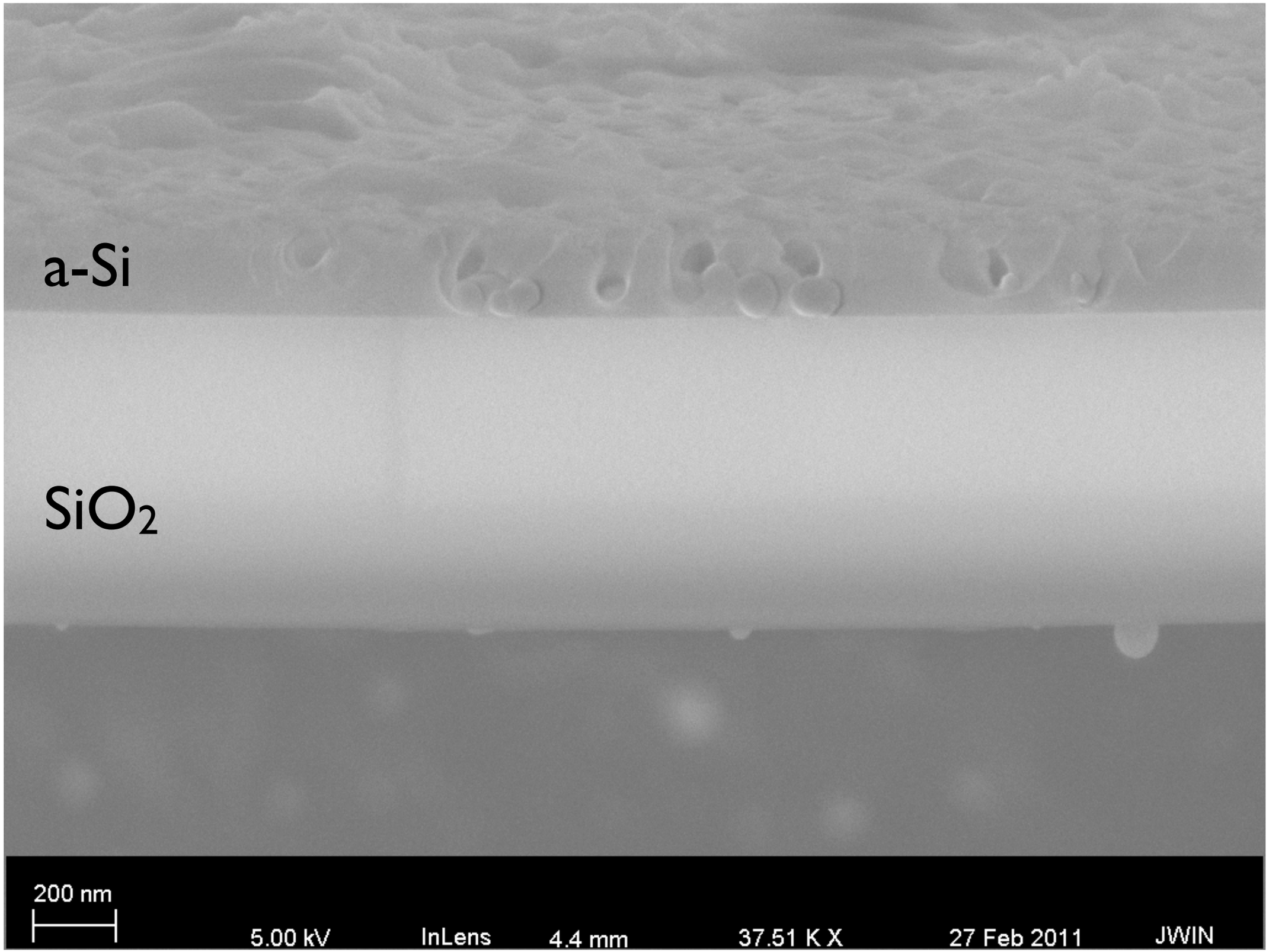
Thermally evaporated Ag after 300 °C anneal in Ar for 1hr

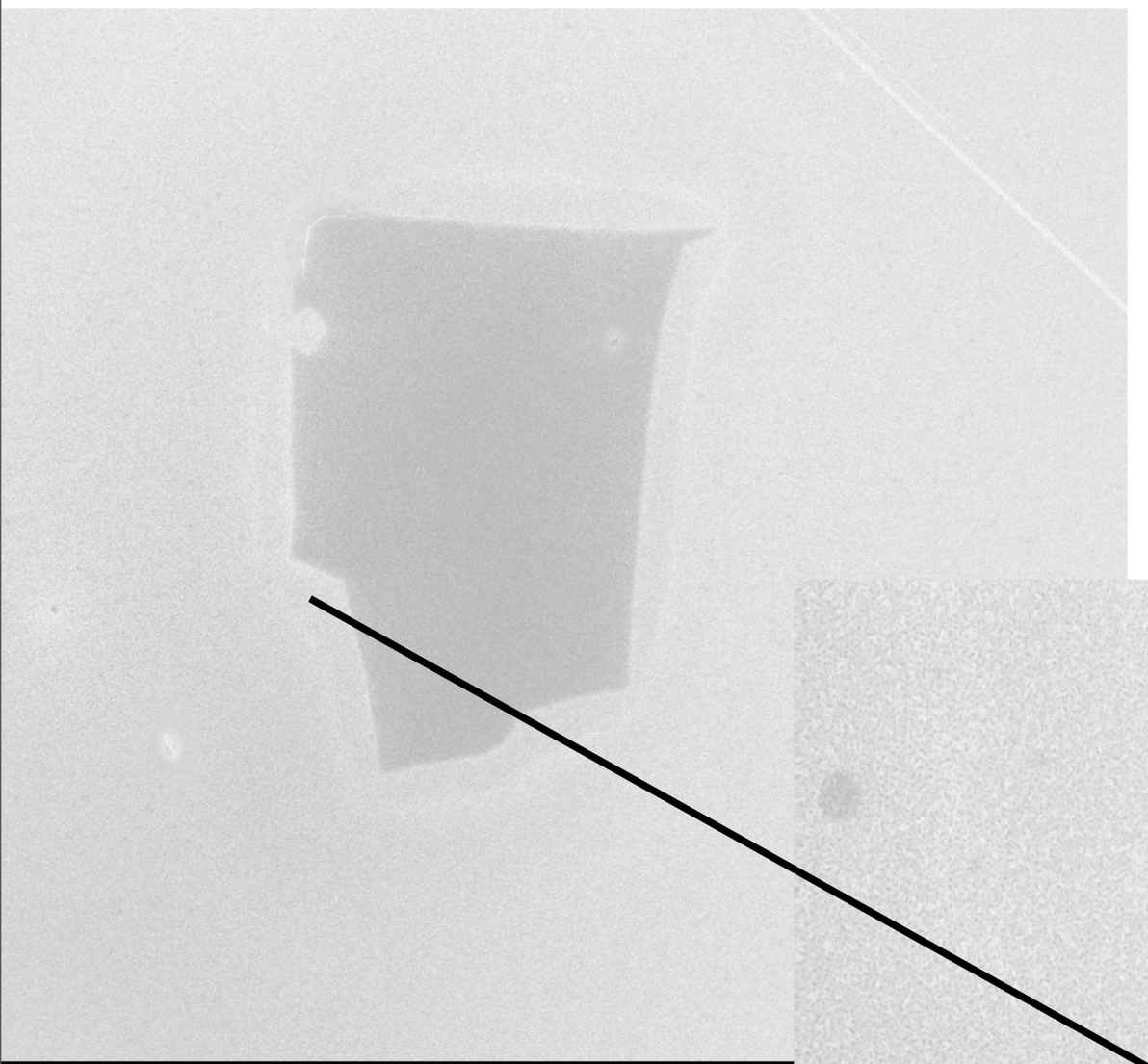


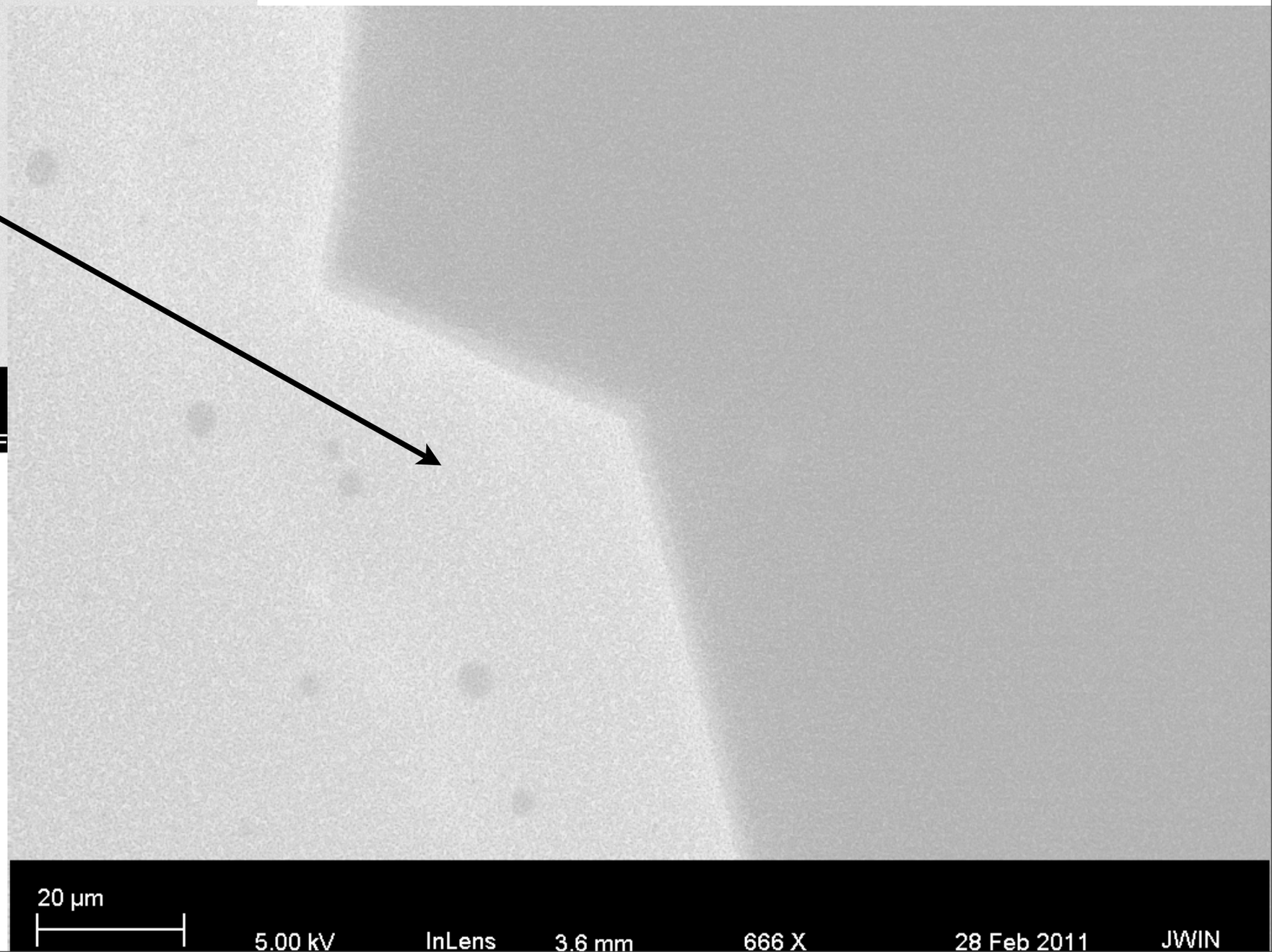
15s etch in 50:1 vol 50%HF:30%H_2O_2

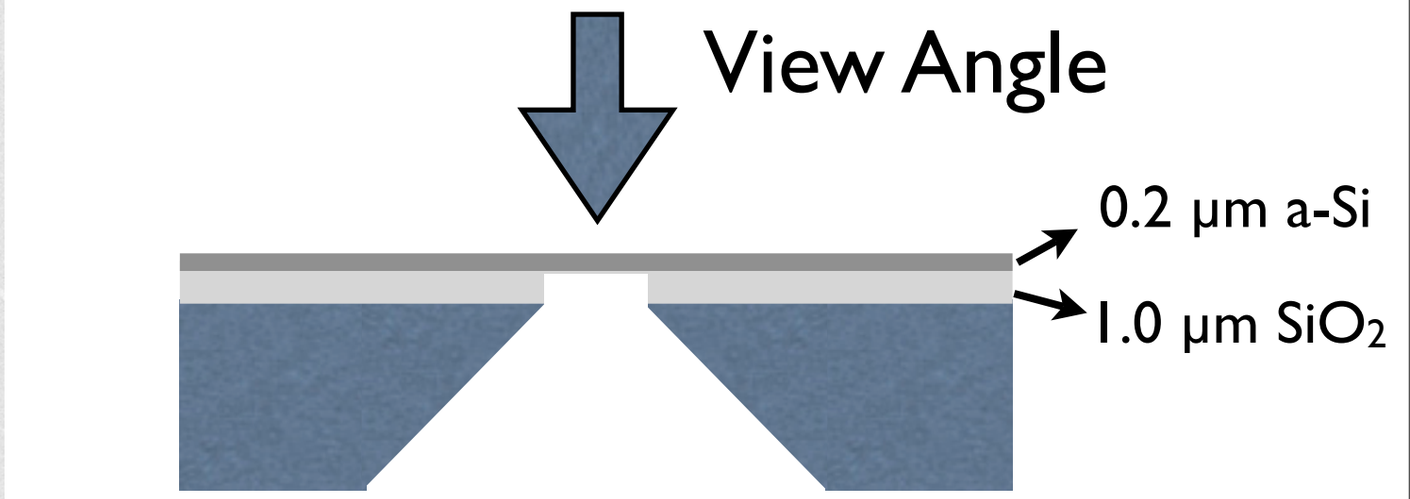


15s etch in 50:1 vol 50%HF:30%H_2O_2

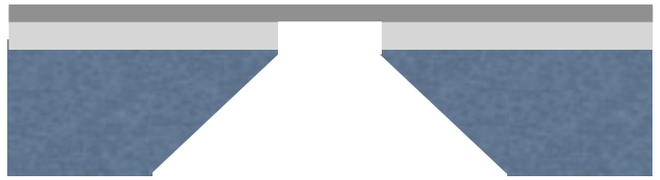



InLens
3.6 mm
94 X
28 F


20 µm
5.00 kV
InLens
3.6 mm
666 X
28 Feb 2011
JWIN

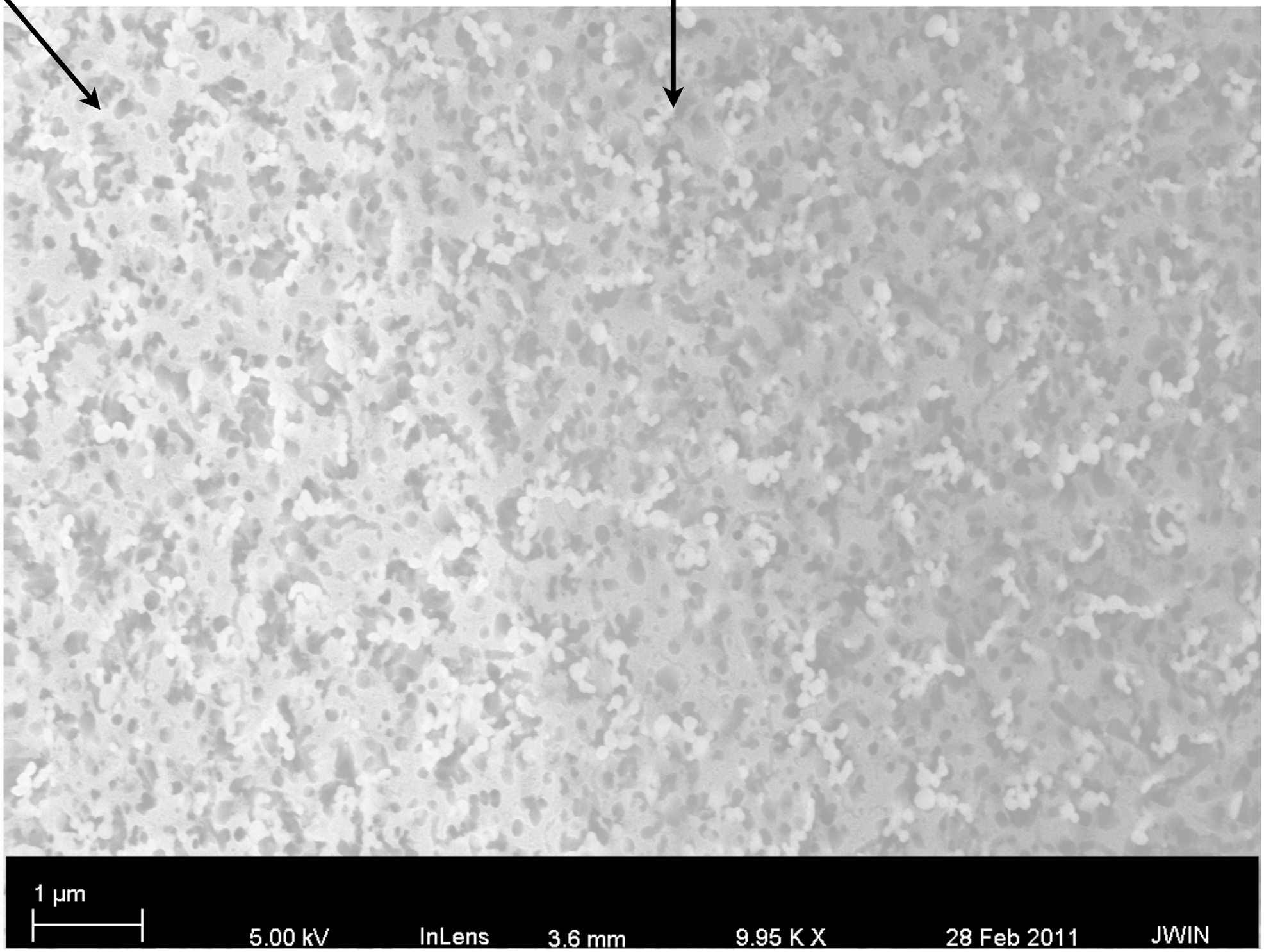

View Angle
0.2 µm a-Si
1.0 µm SiO2

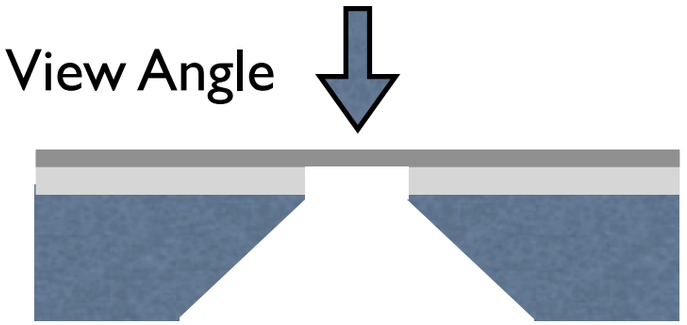
View Angle



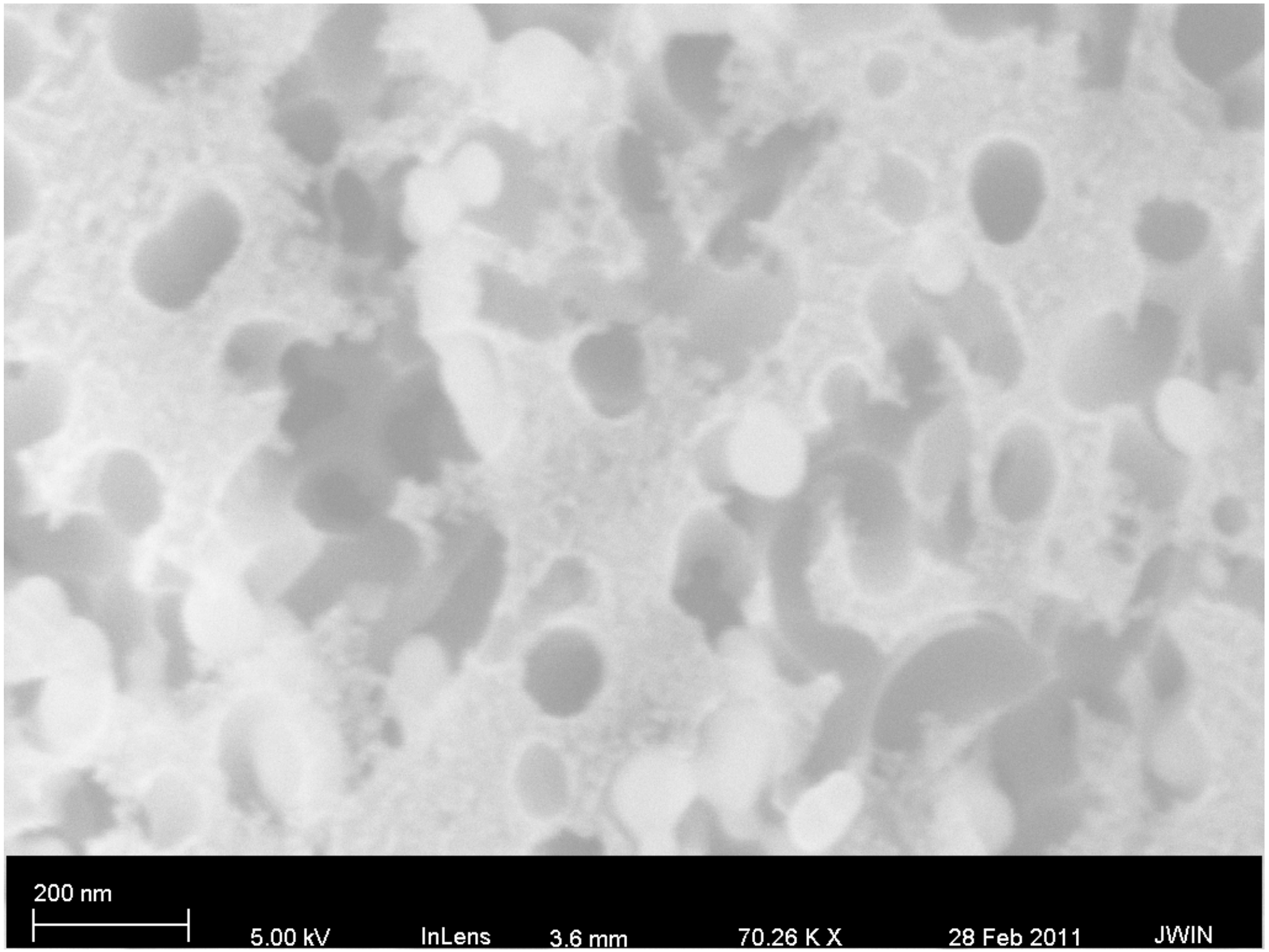
Over substrate

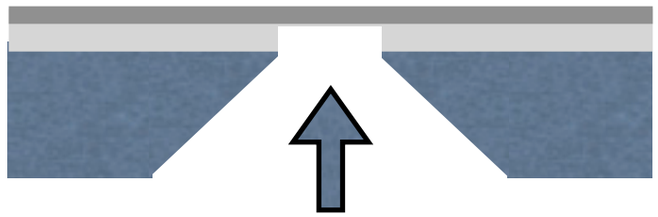
Membrane





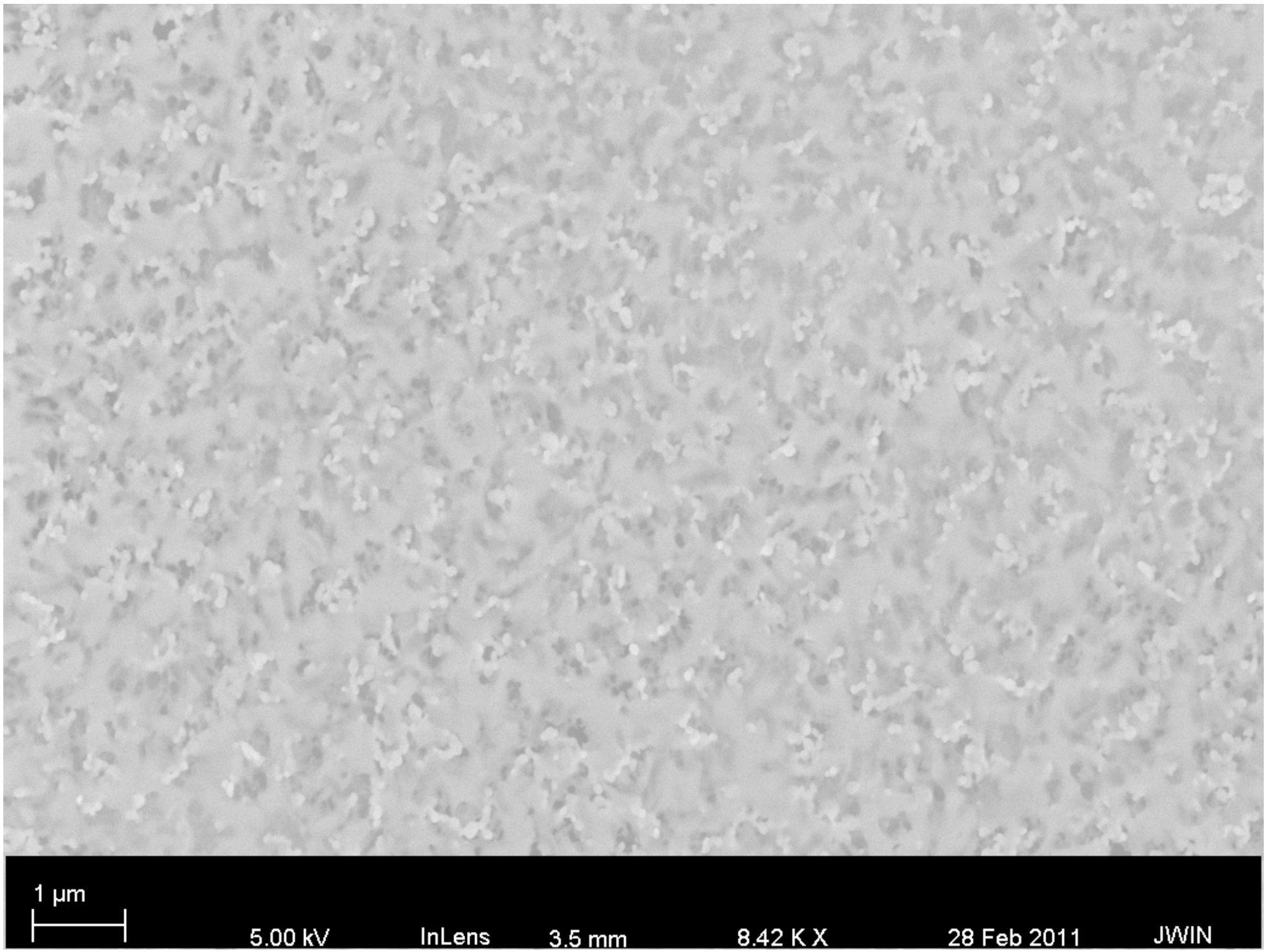
Membrane

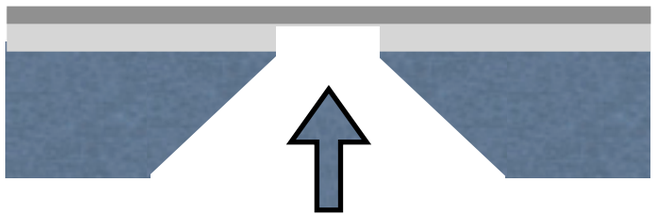




View Angle

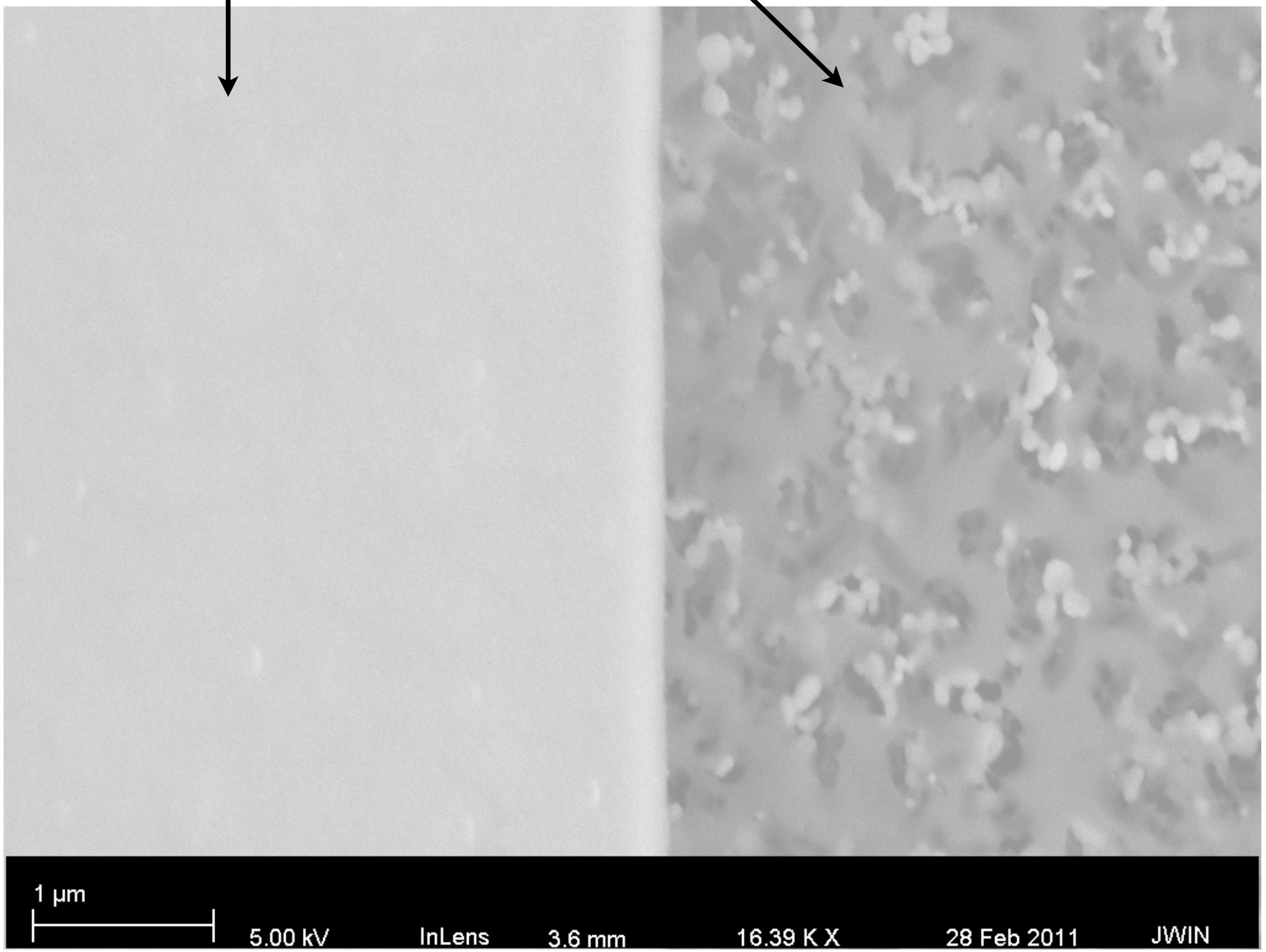
Membrane

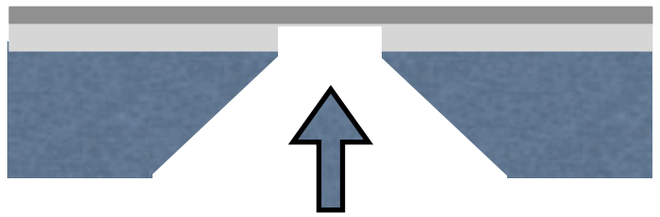




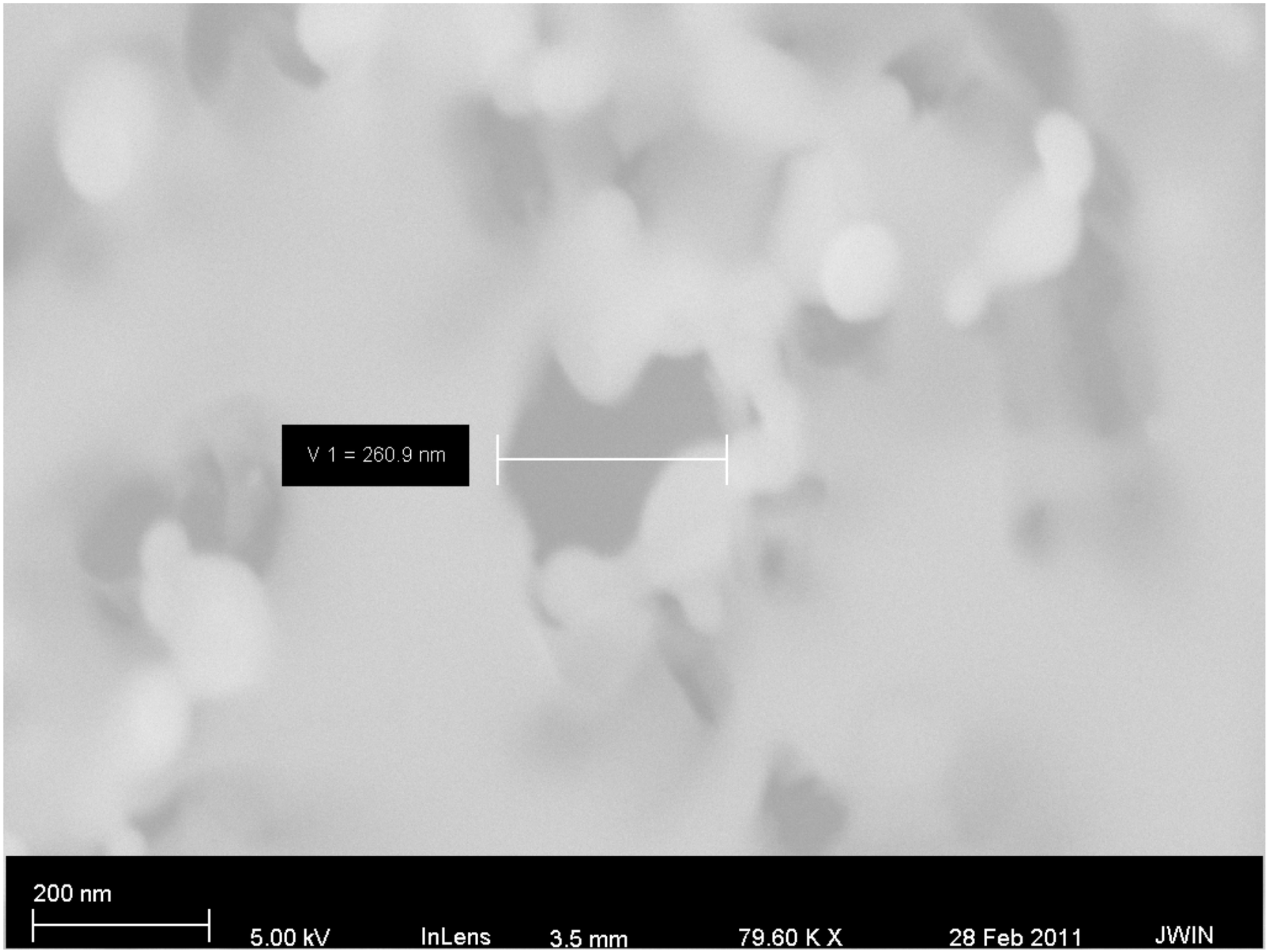
Substrate

Membrane





View Angle



What's Next?

- Answer question: "who cares?"
  - Possible answer
    - pore radius and surface density only limited by metal particle deposition technique
    - membrane thickness variable
- 200 μm DSP substrates with ???? mask
- Test mechanical properties