AAO on Al substrate

TopMembranes Technology Ltd. (http://topmembranes.com/en/)
AAO on Al substrate

- **Effective AAO layer**: the upside AAO layer is effective;
- **Barrier layer**: the thin barrier layer is at the bottom of the AAO layer;
- **Al base**: Al layer is between the two AAO layers;
- **Back AAO layer**: The quality of back AAO layer is not well controlled.

TopMembranes Technology Ltd. (http://topmembranes.com/en/)
If the surface of AAO is covered by a layer of other material such as polymer, the template can be removed from backside, as shown in the next page.

AAO can be removed quickly by NaOH solution (5~10 wt %) at room temperature, but Al reacts with NaOH slowly, releasing hydrogen.

\[2\text{Al} + 2\text{NaOH} + 2\text{H}_2\text{O} = 2\text{NaAlO}_2 + 3\text{H}_2\uparrow\]

Al base can be removed by mixture solutions of CuCl\(_2\) and HCl. Typical concentration of CuCl\(_2\) and HCl are 40 wt % and 10 wt %, respectively. The less concentration of the solution, the slower the reaction becomes.
How to remove the AAO template

Step 1:
Remove the back AAO by NaOH.

Tip:
Large amount of bubbles (H₂) appear after the back AAO being removed by NaOH.

Step 2:
Remove Al base by CuCl₂/HCl.

Step 3:
Remove AAO by NaOH.

TopMembranes Technology Ltd. (http://topmembranes.com/en/)
Cracked AAO film is on the bending surface.

Note: the sample can be twisted into 90° to observe the cross section at the area cracked due to bending. But this method is not suitable for AAO template whose pore wall thickness < 20 nm or pore depth > 10μm.
SEM test of AAO on Al substrate
How to cut the AAO template

AAO template: AAO on Al substrate.
Materials: A metal ruler; A sharp and strong knife; a clean cloth (clean room wiper is suggested, or other clean soft paper); a hard flat support (glass or steel)
Note: Don’t cut the AAO by scissors, or it will curve.
Cutting process:
1. Cover the surface of glass by a piece of cleanroom wiper;
2. Place AAO on the wiper with backside up (Al side up, AAO side touching the cloth);
3. Press firmly with the ruler and slice the AAO along the ruler several times;
4. If AAO is not cut through completely, slowly bend the template until it is set apart;
   - The AAO on Al substrate can be cleaned by ultrasonic cleaning (~1min), using acetone, ethanol, isopropyl alcohol, or deionized water.
单通AAO的切割不可以使用剪刀，否则AAO会卷曲。
切割方法如右图所示：

a) 将干净的无尘布（无尘纸或其它干净而柔软的纸）平铺于玻璃板（或平整的桌面、钢板、木板等）上。
b) 将单通AAO取出，反面朝上，正面朝下放置。
c) 将直尺按压固定于AAO上。
d) 沿着直尺用锋利的美工刀刻划数次。
e) 如未完全断裂，可以将单通AAO人沿着切缝来回弯折几次即可断裂。

单通AAO可以放心超声清洗，可以使用丙酮、乙醇、异丙醇、去离子水清洗。