Does anyone have any suggestions for mask materials to protect Al in HF 49% for SiO2 removal in SOI wafer? The device is SOI, ICP DRIE etched to glass, HF etch to undercut and free devices, but have Al contact pads and AL is dep’d first. Typically we use PR as pattern mask, but the Al is etching behind the PR. In this case the Al is deposited first, so although order of operations change might help, it’s not a good option atm.

Thank you for any suggestions you might have!

**JOE MADUZIA**
*MNMS Laboratory Specialist*
 The Grainger College of Engineering
Mechanical Science and Engineering
2239 Sidney Lu Mechanical Engineering Bldg
1206 W. Green
Urbana, IL 61801

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| **#** | **Name** | **Institution** | **Answer** |
| **1** | Gheorghe IORDACHE | King Abdullah University of Science and Technology,Kingdom of Saudi Arabia | Masking to protect the Al contact pads from HF is tricky.Not sure if you can change the structure but, if the sacrificial layer to free the devices would be silicon, you may consider the improved TMAH solution proposed in this paper: <https://www.sciencedirect.com/science/article/pii/S092442470000546X?via%3Dihub> I used it to make sensors on suspended membranes with Al pads exposed some 20 years ago… J and it works nicely. It’s a bit time consuming to prepare… (<https://www.researchgate.net/publication/237115771_Low-power_micro-scale_CMOS-compatible_silicon_sensor_on_a_suspended_membrane>)  |
| **2** | Felix P. Lu | University of Chicago | An HF etch with Al is tough. We had a similar problem about 10 years ago. From what I can recall, we changed the order of operations, evaporating Al through a shadow mask after the HF etch. This of course required a special jig. I’m happy to share more details if this approach is of interest to you. |
| **3** | Alireza Mesgar | Texas Instruments | Adding Glycerin to an HF solution will reduce the Al etching or even inhibit it. I learned about this many years ago and do not have the references handy.  But by a quick search I found this:<https://gnusha.org/~nmz787/mems/unorganized/wet_etch.pdf> |
| **4** | Peter J Duda | University of Chicago | Couple of options here:1. Vapor HF tools work well for mems structures where you need to etch SiO2 in the presence of Aluminum.  Side note: PR doesn’t work as a mask for vapor HF either. Two manufacturers are:
	1. Memsstar - <https://memsstar.com/mems-tools/vapor-hf-etching/>  - We at UChicago have this tool.
	2. SPTS - <https://www.spts.com/categories/hf-vapor-release-etch>

Transene Al Pad Etch will etch SiO2 and is designed to minimally etch Al (Ammonium Fluoride based etch).  We have used this with a PR mask. |
| **5** | Seung-Joon Paik | Georgia Institute of Technology | There are two papers about Al protection while etching sacrificial oxide layer, experimenting various mixtures of HF, NH4F, and Glycerin by volume. Though they are written in Korean, figures and tables are in English, so you can figure out where to start. <https://www.koreascience.or.kr/article/JAKO199900842576322.pdf><https://www.koreascience.or.kr/article/JAKO200000842576127.pdf> |
| **6** | Roberto R. Panepucci | CTIBrazil | We switched to Au pads and also going to vapour HF to release SOI waveguides a while back (some 20yrs...). I am looking for a ´modern´ solution for this as well, so I hope someone points out that nowadays compound X by company Y does this very easily...  |
| **7** | Macdonald Robert | GE Research, US | HF vapor release may be an option. Various NNIN centers have these tools available for you.Here is SPTS’s sales brochure:<https://www.spts.com/assets/media/hf-intro-us-feb2021.pdf> |