PROCESS OR MATERIALS REVIEW REQUEST FORM

Request Title: **25% TMAH Etching at WBFlexCorr**

Requestor: **Mary Tang, Uli Thumser** **Date:** **Mar. 12, 2021**

Non-SNF staff, please complete the following:

Badger ID:

Company name/PI:

Send completed form to: snf-promcommittee@lists.stanford.edu

1. **The chemical or material.** Please provide all common names, trade names, and CAS numbers where appropriate. Include an MSDS, if available; or provide the reason, if not. Make sure to include information for any new secondary chemicals (such as a developer for a new resist). Read the MSDSs as well as the Stanford Chemical Storage Groups to determine the Storage Group Identifier and Main Hazard Class of your chemical/material.

   25% solution in water of Tetramethyl ammonium hydroxide, or TMAH

2. **Vendor/manufacturer info:** address and phone number, website URL.

   JT Baker/Avantor, VWR Part number JT5879-3

3. **Reason for request:** Please give serious thought to this. If you have any process information (application notes from the vendor, protocol from another lab, experimental methods section of an article), please include it, preferably as attachments. Ask yourself these questions: Is this the latest procedure? Are there newer/safer alternatives that will also work for my project? Will any of the current SNF approved chemicals and materials work for me?

   This request is to formally document the procedure for using 25% TMAH at the WBFlexCorr bench for anisotropic etching of silicon. We encourage labmembers to use 30% KOH for this purpose. However, TMAH etching has better silicon etch selectivity to silicon oxide and aluminum than KOH. Also, there may be situations where alkali-ion free processing is required and RCA decon is not possible. So, recognizing there are situations where there is no suitable substitute, we want to establish this procedure as required of all labmembers who want to use this process.

4. **Process Flow:** Please provide a detailed process flow description on how and where you proposed to use this chemical. This should include **all Lab equipment** to be used for processing your wafers once your new chemical or material has been used (even if your

new material is a film that is removed, it may still pose potential contamination concerns.) Make sure to include wet benches. Please note that if the chemical/material is to be used in any the "clean" equipment, purity specifications will be needed. This is most important for chemicals/material that are not normally used for VLSI device fabrication. To be allowed into a "clean" tool, the material should MOS grade or better.

Administrative Process: Labmembers may use TMAH as for conventional, anisotropic etching of silicon, but must register their use with the ProM committee. This entitles the labmember to use TMAH for the duration of their project under this PI or organization. When the PI or organization changes, the labmember should re-register. This is accepted as acknowledgement by the PI or organization of this process decision. TMAH users must have a buddy when processing and both must fill out, sign and return the TMAH checklist to the ProM (attached.) Our obejctives are to ensure:

1. **the labmember is aware of the safety hazards and is fully trained in processing with TMAH.**
2. **due diligence, that other alternatives have been considered.**

Training: In addition to regular training on the WBFlexCorr wet bench, the labmember must review the TMAH Fact Sheet on the EH&S reference site and discuss with a staff member.

Availability of chemical: SNF will stock only a limited amount of 25% TMAH, so cannot guarantee to have material available at all times. The lead time is 6-8 weeks, so it is the responsibility of the labmember to ensure there is sufficient material on hand in advance of their experiment. SNF will not normally store 25% TMAH in the Chemical Passthrough; the labmember must email the ProM at least two working days in advance of their reservation to have the TMAH placed in the Passthrough. When the experiment is done, the labmember must notify staff.

Preparing the station: The labmember must reserve the whole WBFlexCorr bench, so that no other users are sharing the bench while TMAH work is being done. When performing the work, the labmember must block off the aisle, using the bollards and yellow chains. The aisle should remain blocked off until the TMAH is completely disposed of and all the lab ware is fully rinsed. The labmember must print out the safety information and keep in a visible place at the station, so that if there is a suspected incident, medical response professionals will be provided with this information.

Safety Buddy: The labmember must have an on-site buddy who is knowledgeable about TMAH processing, ideally someone from the same group. The buddy should be check the station preparation, observe TMAH handling (transport, pouring, and draining) from a

distance, and check station cleanup. Buddy should be on-site and in the lab during chemical transport and pouring steps. Buddy must observe but be remote for handling and cleanup.

Processing: In other regards, TMAH can be used for processing in the same way as KOH. Labmember should wear full PPE, including face shield, when pouring or draining TMAH or processing samples in TMAH. Work should be done at least 6 inches from the front face of the bench shields and shields must be kept down. The chains and bollards should keep others away from the vicinity when processing is taking place.

5. **Amount and form.** How much will you bring in? Is it solid, powder or liquid? (Note: as a general rule, powders are not permitted in the cleanroom.) Do you need to mix it to use it?

6. **Storage:** Will you be storing your chemical/material at SNF? If so, please note any potential reactivity's (this should be on the MSDS). Storage groups A, B, D and L are stored in the yellow solvent cabinet in the furnace support area, while storage groups C, E, F and G are stored on top of one of the Pass-through Carts. Ensure your chemical container or material is properly labeled. If there is no available room, it must be stored by in the bulk storage area. You will then need to obtain it from receiving area personnel each time you want to use it and return it to them when you are finished using it (or each time you leave the lab). Note that there is no storage of chemicals/materials in the processing lab or at any wet bench.

7. **Disposal**: How will you dispose of any waste or excess chemical or material? In your discussions with experts and vendors, try to determine the best way to dispose of your spent chemicals and by-products. Please refer to the SNF Lab members Safety Manual for the different methods of waste disposal that are available in the lab.

To be completed by the PROM COMMITTEE:

Special handling requirements:

On-going approval or staff interaction requirements:

Approved By/Date: SNF PROM Committee 3/12/2020