Etching, flattening, and packing/unpacking of zircon fission-track mounts

Etching:

- Etching of zircons is done in a KOH:NaOH eutectic melt at 228ºC. The etching duration depends on the age and the uranium content of the sample. Detrital samples contain different zircons from different sources, likely with different ages and uranium contents. Therefore, it is essential to etch several mounts per sample (e.g., 3) for different amounts of time. But also for igneous bedrock ZFT samples it is advisable to prepare 2 mounts, in case one mount is overetched at the first try or the sample is only partially annealed.

- Mix KOH and NaOH together in the given ratio in clean, dry Teflon bowls.
- Set the oven to 228ºC and place the bowls into the holding device.
- When the phases are melted, place the ZFT mount with the grains facing down on top of the melt. They will float.
- Note in the etch protocol, which sample you placed where (numbers on the holding device) and for how long you set them to stay in at least. Preferably you choose a relative short time interval of 6–12 hours to check all samples to avoid overetching.
- When taking mounts out, drop them into hot, soapy water. Then rinse them under hot water to remove the etchant. If not done properly a thin film remains on the mount surface that cannot be removed.
- Check the result of the etching under the fission-track microscope and decide whether the sample was etched just right, or is over- or underetched. When underetched, etch the sample again. When overetched, start the process again with another mount of the sample at a shorter etching duration. When you have detrital samples, it is likely that some grains of one mount are overetched, while others are well etched or underetched. Make sure that, overall, you have mounts representing all different “etch populations”.
- After a few days, the eutectic melt will flocculate and you need to renew it. When all samples from one Teflon bowl are done etching and out, take out the bowl and renew the KOH and NaOH. When it is melted, samples can be placed in it again. Renew the melt in a rotating system, when you have that many samples that you etch over a long period of time.
- The mounts are not to be touched after etching. Only use gloves and tweezers.
- When done etching leave the oven on. See below.

Flattening:

- ZFT Teflon mounts will not be completely flat after processing. To flatten them again, put them between two thick glass plates and fix the plates with large clips.
- Put the plates with the mounts into the oven (228ºC) for 15 minutes. Make sure it is not longer, then the sample IDs will not be readable any more.

Packing:

- See the AFT packing instructions. It is the same procedure. The only difference is that you need to use different standards and different dosimeter glasses (IRMM-541).