Clogging prevention

A small particle stuck in your chip can destroy your experiment or production. It can take a lot of time to clean the chip, or in the worst case the particles are totally stuck and you need a new chip. The smaller the channels of your chip, the more likely it is that your chip will be clogged. You might need to take some extra measures to prevent this. The first step is to know where the particles come from.

Some possible origins of particles

- Dust from the air and open surfaces
- Bigger particles or contamination in the fluids
- When re-using chips: dried, solidified leftovers from previous runs
- Components used in your fluidic setup
- Particles left after cleaning

Dust from the air and open surfaces

In a regular room, air contains about 300.000 particles per m^3 bigger than 5µm. These dust particles also collect on open surfaces like tabletops. These particles can find their way into your chip whenever the setup is not fully closed. Make sure to always use new, cleanroom packed materials or clean the components that come into contact with your fluids before every use.
A second measure that can prevent contamination from dust is working in a cleanroom. For most of Micronit's applications this will not be necessary but it could make working with the chip easier and faster because you don't need to clean components all the time.

Examples

- If you disconnect tubing and place this tubing on the table, it will be full of particles that can clog your chip. Make sure to clean the tubing before using it again in your setup. As long as you keep the setup fully closed, the tubing will remain free of contamination from the air or open surfaces.
- If you store your (used or unused) chips with inlet holes facing up, they will slowly collect particles. Make sure to cover the inlet holes, or place them face down, when not using the chips.

Bigger particles or contamination in the fluids

It is possible that your fluids contain particles that can clog your chip. The fluids could be delivered with these particles or the particles are accidentally added via other materials or dust from the air. It is always recommended to use an in-line filter before the chip, even when there are filters on the chip itself. Make sure the filter has pores that are significantly smaller than the smallest features on the chip, but large enough to let relevant material get through.

Leftovers from previous runs

Chips can clog when they are being re-used. For example, when solutions with soap or salt are used and the chip is left to dry, clusters or crystals could form. Sometimes these are hard to dissolve again. It is recommended to flush the chips with an organic solvent that evaporates completely before storing the chip for later use.

Components used in your fluidic setup

Ferrules, tubing, reservoirs, sensors, holders… anything your fluid comes in contact with could contain particles. Make sure to only use cleanroom packed, new components or flush all components before use.

Particles left after cleaning

Make sure the solvents and devices used to clean the chips do not contain particles themselves. Another thing to be aware of is that particles can brake off of the chip itself as a consequence of aggressive ultrasonic cleaning. This is the least likely cause of particles clogging your chip, but it can happen. Some rough surfaces, especially top side inlet holes in glass, have structures that are connected to the bulk of the material but could be released under aggressive circumstances. When using ultrasonic cleaning, pieces of the chip's surface could be released.