# How to use the sheet nozzle chip

The ultrathin nanosheet nozzles can produce the thinnest free liquid sheets ever generated. They use gas dynamic forces to reduce the thickness of a liquid jet to under 20nm at the thinnest point. The gas flow also helps prevent freezing when the nozzles are operated in vacuum. They are a 2-port device. When operated with the first port (closest to edge) with gas (helium works especially well for the thinnest jets) and the second with a liquid, it forms a thin sheet orthogonal to the plane of the chip. It is about 200 micrometers in width and about 400 long – just barely visible to the eye. These sheets are tunable – the thickness and width can be changed by changing the gas and liquid pressures. They are non-uniform in thickness with the thickest part near the nozzle and thinnest at the apex. (see *Koralek, Jake D., et al. "Generation and characterization of ultrathin free-flowing liquid sheets." Nature communications 9.1 (2018): 1353.*)
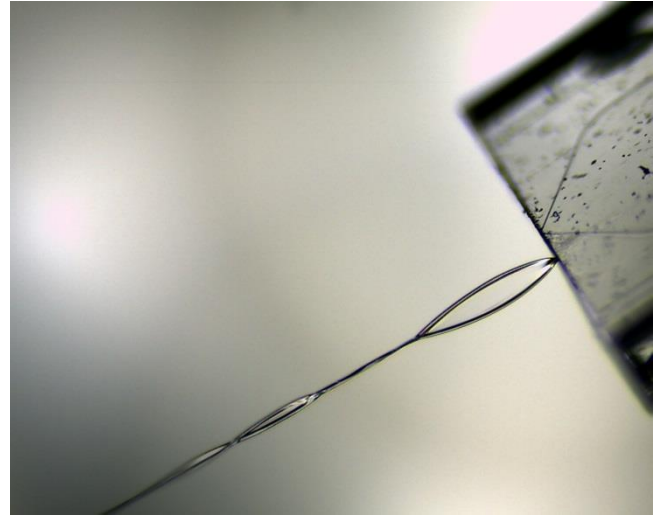
These nozzles can also be operated in colliding jet mode. When liquid rather than gas is used in the first (gas) port it forms a sheet from two colliding jets. These two jets collide just inside the chip edge. They are fixed in position by the chip geometry and need no alignment.