

An optimized membrane inlet system (MIS) for underwater sensors - From idea to product

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The pressure resistance in the deep ocean is most important for in-situ measurements. In case of the underwater mass-spectrometry (UWMS) especially the requirements of the combination of high permeability for fast low detection limits and stable structures for pressure resistance in the membrane-inlet-systems (MIS) are challenging. In the third funded project "SensorEplus" as well as in one master thesis a MIS was redesigned and optimized to get high pressure resistance with high gas permeability.

The specific details for the new product were pressure stability of up to 3000 m (300 bar) water depth, and maximum porosity of the membrane supporting structure for gases to get low limits of detection for several gases and chemicals. We used micro-printing as well as micro-lasering to manufacture the product. The new product has a cylindrical form with a diameter of 1/8" at a length of 13 mm.

To check the stability of the MIS the components were tested in a high-pressure tank at the AWI facilities to prevent a failure of each component. The permeability of the new developed MIS was tested with the AWI-UWMS to get a comparison of the old MIS supported by a spring and the new structure.

Here, we will present the evolution process, result in term of pressure resistance and permeability as well as the final structure of the new "German Frit".