

Sophi™ MS chips^{RUO}

Sophi mass spectrometry chips are laboratory consumables based on advanced surface chemistry that bring lab-on-plate concept into the clinical mass spectrometry. In the lab-on-plate workflows, as coined by Zenobi and coworkers [1], the plates are used not only as sample supports, but beyond that: as functional parts of analytical protocols that incorporate detection by MALDI-MS or matrix-free LDI-MS. Sample preparation procedures can be performed directly on the MALDI target plates prior to the ionization of analytes in the ion source of a mass spectrometer. These include preconcentration, amplification, purification, digestion, derivatization, detection with complementary techniques, or other steps. Extensive sample treatment as well as bioassays can be performed directly on MALDI target plates prior mass spectrometry detection. The surface chemistry that is used to modify the plates to give them useful functionalities is the key future of the concept. **Sophi™** plates are modified by patented process (US10180435B2), that utilizes ambient soft and reactive ion landing (softlanding). Ion landing is a dry deposition process that allows surface modifications that cannot be achieved by other means. The **Sophi™** affinity assays are based on the interaction between the immobilized affinity molecule and the sampled analyte directly on the chip and subsequent analysis by mass spectrometry. The electrosprayed affinity molecules of choice are immobilized on dry inert metal or metal

oxide surface of the chip, which is nonreactive under normal conditions. The ion landing is performed by an automated ion landing apparatus that can manufacture chips with a predefined array of sample positions or any other geometry of choice. The chips prepared by this technique are fully compatible with MALDI ionization because the metal-based substrates are conductive and durable enough to be used directly as MALDI plates. Compared to other materials, the nonreactive surfaces show **minimal nonspecific interactions** with chemical species in the investigated sample and are thus an ideal substrate for selective affinity chips for samples with complex matrix, such plasma, serum or urine. Currently available **Sophi** chips cover four clinical assays in diverse areas of clinical relevance. They serve as examples **Sophi MS Chip** use and application:

- **Haptoglobin phenotyping**
(metabolism, oxidative stress and diabetes)
- **Procalcitonin determination**
(bacterial infection diagnosis and evaluation)
- **Transferrin deglycosylation CDT**
(addictology and alcoholism treatment)
- **Activity of toxin B** (microbiology)

Other assays are in development and affinity molecules of customers' choice can be immobilized per request, as described in the literature [2].

References

- [1] Urban P. et al.: Lab-on-a-plate: extending the functionality of MALDI-MS and LDI-MS targets, Mass Spectrom Rev. 2011, 30(3):435-78.
doi: 10.1002/mas.20288.
- [2] Pompach P., et al.: Protein Chips Compatible with MALDI Mass Spectrometry Prepared by Ambient Ion Landing Anal. Chem. 2016, 88 (17): 8526–8534.
doi.org/10.1021/acs.analchem.6b01366.



Antibodies **softlanded** on a conductive (metal) surface