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The invention relates to a device (10) for extracting volatile species from a liquid (20) connected to an inlet of an analysis instrument, such as a mass spectrometer (MS). The device has a chamber (4), a membrane (5) forming a barrier for the liquid at zero differential pressure between the inside and the outside of the chamber, and allowing passage of the volatile species at zero differential pressure between the inside and the outside of the chamber. The device has an inlet capillary channel (3) to feed in a carrier gas and prevent back-diffusion from the chamber, and an outlet capillary channel (6) which provides a significant pressure reduction, e.g. from atmospheric pressure in the chamber (4) to near-vacuum suitable for an MS. The invention combines the best of two worlds, i.e. the fast time-response of a DEMS system and the high sensitivity of a MIMS system, since a differential pumping stage is not needed.

**General information**

State: Published
Organisations: Department of Physics, Experimental Surface and Nanomaterials Physics, Department of Micro- and Nanotechnology, Silicon Microtechnology
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Publication date: 19 May 2016

**Publication information**

IPC: G01N 1/22 A I
Patent number: WO2016075208
Date: 19/05/2016
Priority date: 14/11/2014
Priority number: EP20140193254
Original language: English
Electronic versions:
WO2016075208A1.pdf
Source: espacenet
Source-ID: WO2016075208