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Self-sufficient Degasser for Micro Dosing Processes

Gases dissolved in liquids can cause serious problems in chemical or biotechnological processes. The degassers available for tackling this challenge today are bulky and expensive, and can in most cases only be used in laboratories with special infrastructure at their disposal. The scientists at Fraunhofer EMFT have developed a small, self-sufficient degasser for micro dosing processes, with an integrated micropump for creating the vacuum, which is necessary for the degassing process.

Several analysis and processing tasks in medical technology, biotechnology or chemical industry involve handling of minute amounts of liquids. Gases dissolved in the liquid may disturb such complex processes. For example, changes in pressure or temperature can cause the gas in the liquid to outgas, resulting in tiny gas bubbles in the liquid. These in turn may lead to falsified measurement values of the sensors, diminished compressing ability of the liquid, or lower performance of the equipment. In worst case the whole system may fail, for example if valves or tubes are blocked by gas bubbles.

Small and flexible

The scientists at Fraunhofer Research Institution for Microsystems and Solid State Technologies EMFT in Munich have developed a self-sufficient micro degasser, capable of removing gas bubbles and dissolved gas from a liquid. The functionality is based on guiding the liquid through a porous tube running through a vacuum chamber, the micropump being deployed for generating the negative pressure in the chamber. The degassing effect is caused by the dissolved gas reacting to the pressure change by diffusing through the tube walls into the surrounding chamber. This principle is not necessary new; the degassers available on the market today also deploy vacuum for removing gases from liquids. However, such systems are often bulky and expensive. Additionally, they require a vacuum connection, mostly available only in well-equipped laboratories, whereas the Fraunhofer EMFT degasser can do without special infrastructure.

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Integrated micropump creates the necessary vacuum

The heart of the system is a silicon micropump developed at the Fraunhofer EMFT and integrated in the degasser. It is capable of producing negative pressures of up to -55 kPa, which is enough to create the necessary vacuum in the chamber and to maintain it during the degassing process. The fact that only a power outlet is needed for the operation opens up wide application opportunities. A further benefit: a pressure sensor has been integrated into the chamber, enabling the activation of the pump at need, when the defined pressure limit is exceeded. This saves energy and prolongs the lifetime of the micropump.The traditional degasser pumps, by contrast, have to be kept operating at all times. Fraunhofer EMFT presents a demonstrator of its micro degassers on this year's Achema trade fair in Frankfurt am Main (11.06.-15.03.18), Hall 9.2, Booth D66.

Degasser with an integrated micropump for creating the negative pressure necessary for the degassing process © Fraunhofer EMFT/Bernd Müller

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