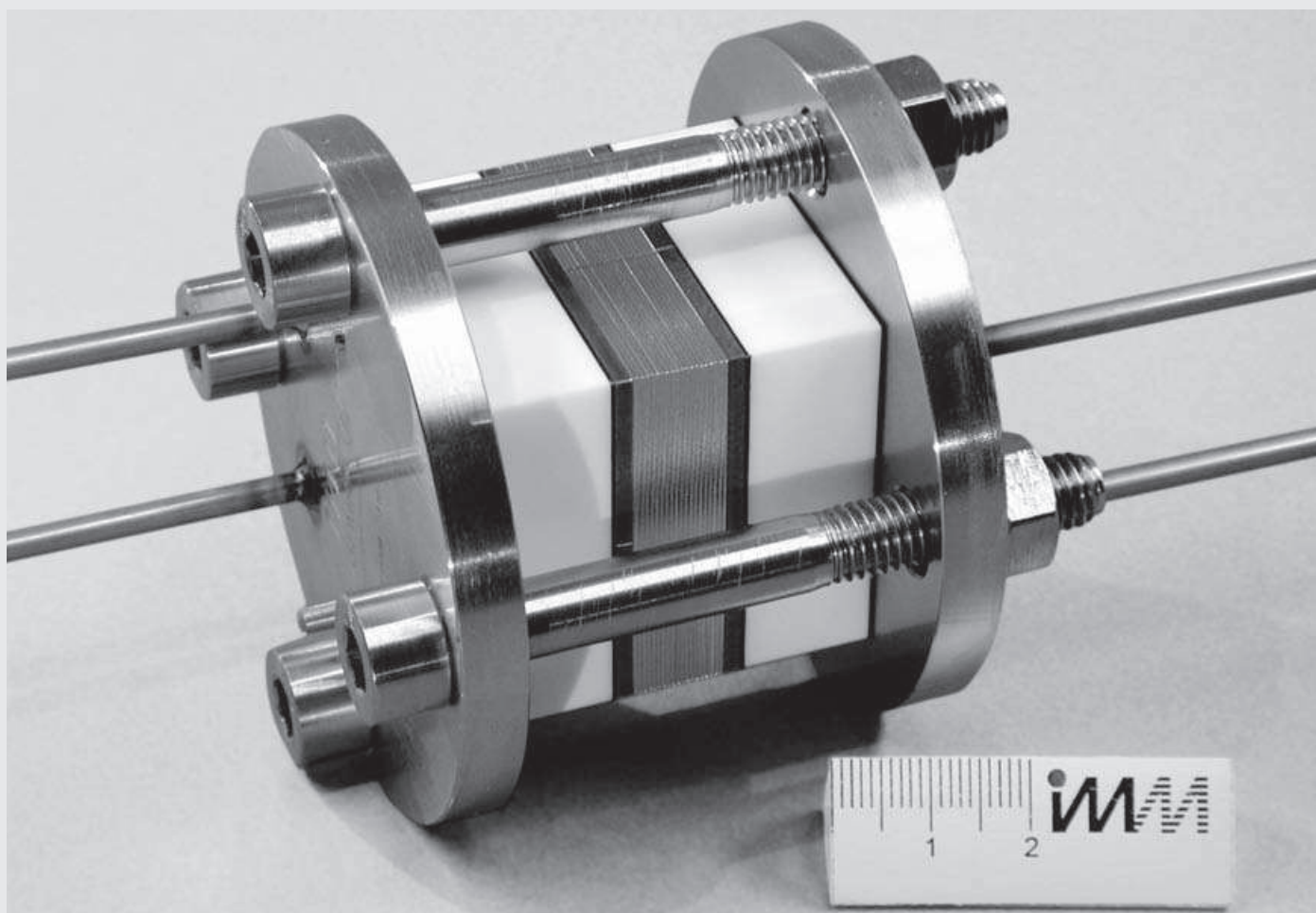


GAS PHASE MICROREACTOR

GPMR

68

03



Gas Phase Microreactor

Principle

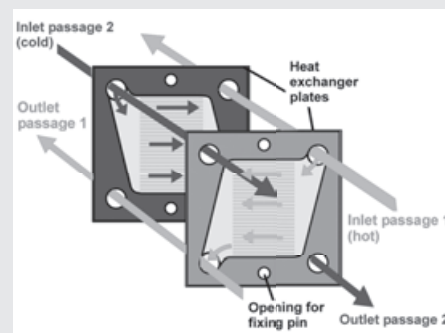
The Gas Phase Microreactor comprises a stack of several microstructured plates (generally 10 + 10 plates) that are arranged for counter-flow or co-current flow practice. Each plate consists of 34 parallel micro channels of 300 μm width and 200 μm depth. The plate stack is encompassed by two ceramic Macor[®] plates, for thermal insulation to the environment and the two steel end caps. The GPMR is a modular system which can also be customized (e.g. one passage solely with electrical heating: No insulation plates, special designed end caps with integrated heat cartridges).

The plates can be coated with catalyst, so that the assembled device can be operated as gas-phase reactor, either with or without internal heat transfer.

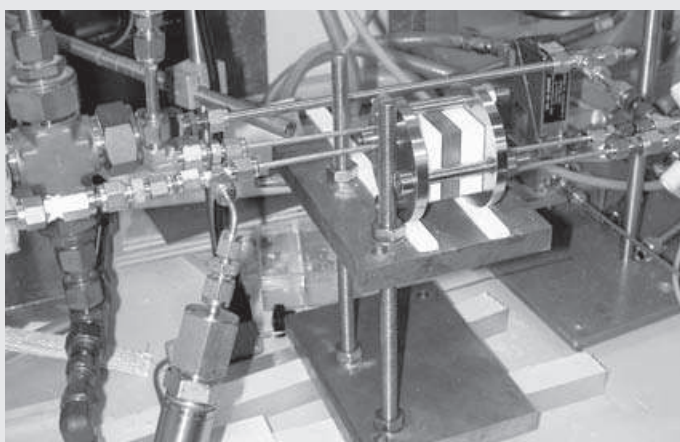
Intense studies on periodic reactions were made with this reactor by three well-known European research groups, concerning the oxidation of propane, the dehydration of isopropanol, and the selective oxidation of isoprene to citraconic anhydride.

On request, catalyst deposition in the micro channels can be offered as well. Most commonly, wash coating of different carriers, e.g. of various aluminas, and subsequent catalyst impregnation are applied. Coprecipitation and sol-gel techniques were applied as well for catalyst deposition.

The device can also be used as a gas-phase and/or liquid-phase micro heat exchanger.



Counter-flow principle



Gas phase reactor installed in bench-scale plant

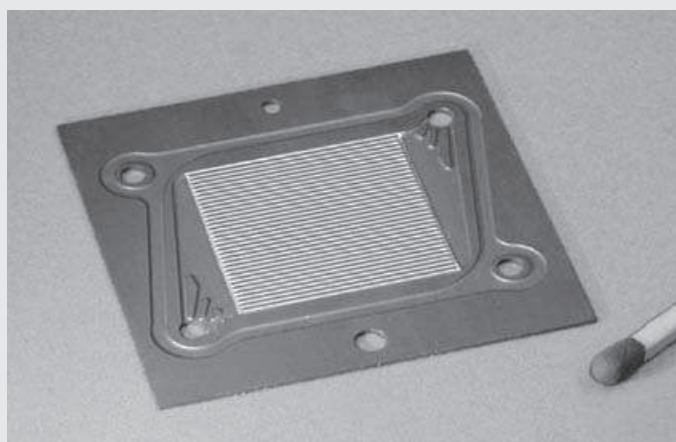


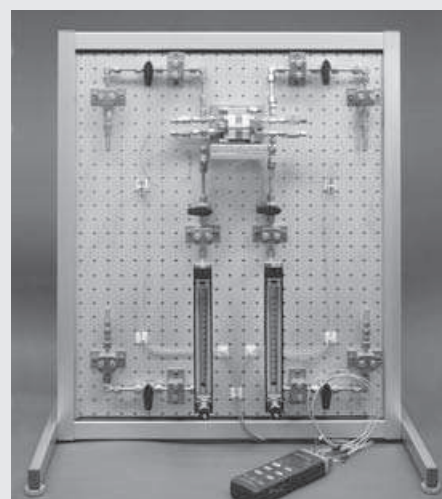
Plate coated with catalyst

Technical Data

Name	Gas Phase Microreactor
Order number	GPMR
Size (L x B x H)	70 x 70 x 55
Connectors (Inlet/Outlet)	1/8"
Standard material	1.4571 for housing and catalyst carrier Glass ceramics MACOR for insulation layer
Number of catalyst plates	20
Size of catalyst plate (mm)	40 x 40
Channel geometry of the catalyst plates (μm)	300 x 200
Options	GPMR is also usable as a single heat exchanger; end caps for heating cartridges

Operating Conditions

Temperature ($^{\circ}\text{C}$)	500
Pressure stability (bar)	3
Flowrate (l/h) liquid/gas	1 – 7 / 1 – 600
Leakage Class	$L_{0.1}$
Heat transfer area (m^2/m^3)	18000
Total inner surface per layer (mm^2)	580
Specific inner surface per layer (m^2/m^3)	2900
Active inner volume per layer (mm^3)	32
Operation mode	Counter- or co-current flow



GPMR integrated into a plant, here as simple heat exchanger (COMH) for education purpose