# Testing setup for automatic cycling of metal hydride composites

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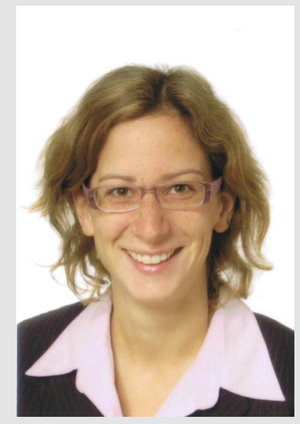


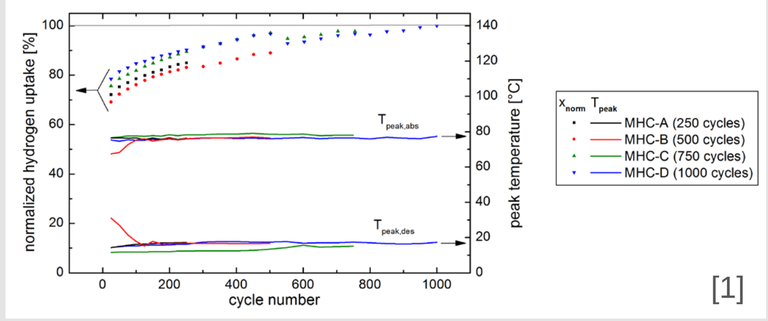
**Goal:**
Metal hydride applications

*Heat pump*
*Pre-heating*
*Air-conditioning*
*Thermal compressors*
*$H_2$ storage*
*Purification systems*
*Etc.*

→pelletized material suitable

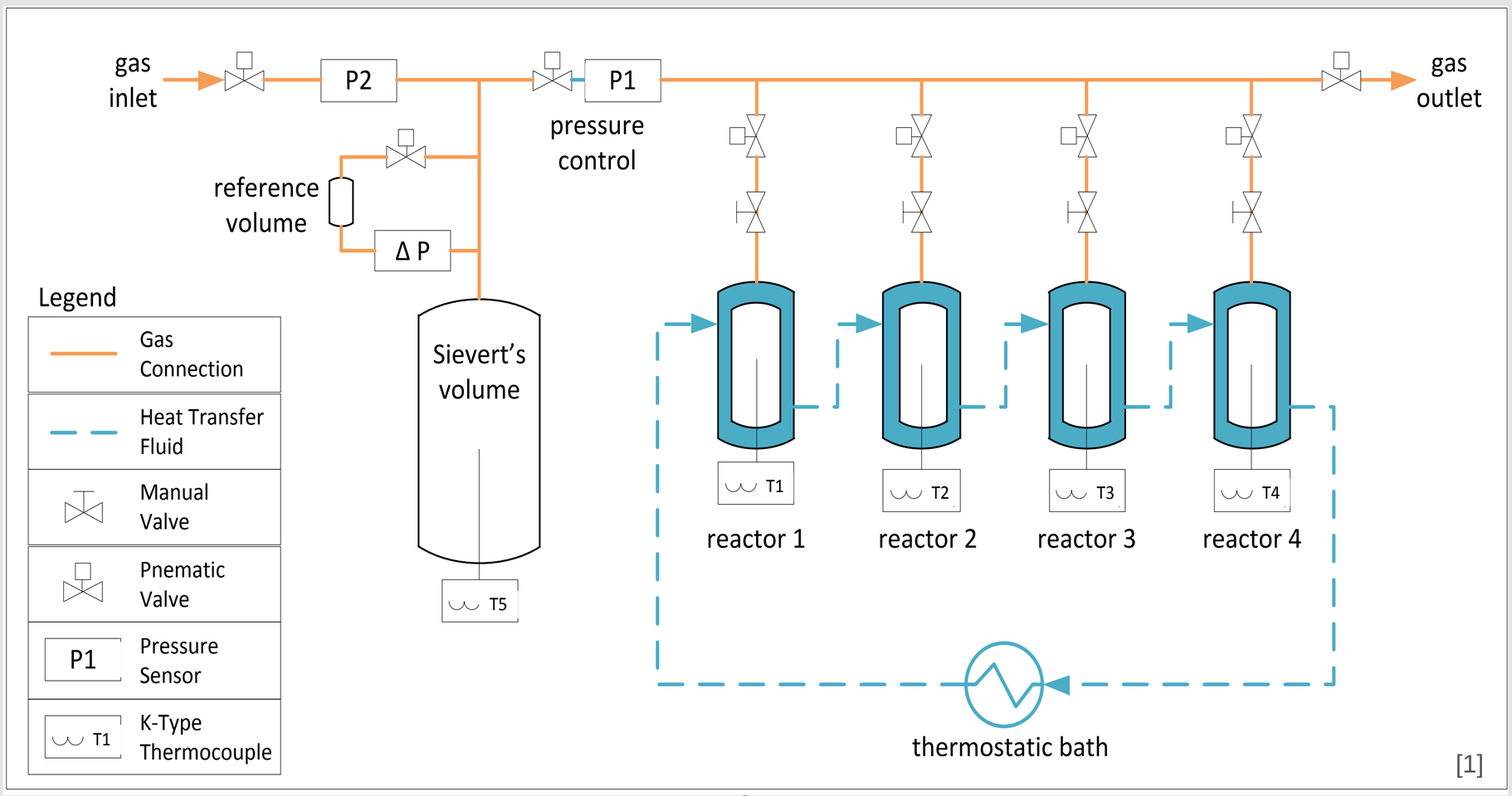

[1]

→ long term cycling stability?




[1]

## Testing setup:




[1]

## Main Characteristics:

- Fully automatic cycling
- 4 reactors with different sizes and/or different materials can be tested in parallel (up to 1.8 g $H_2$)
- Temperature range: -20 …..300 °C
- Pressure range: $10^1$…$10^7$ Pa
- Composition of gas can be varied
- Setup available for projects, etc.

## Testing Experience:

Hydralloy C5 [1]
- >1000 cycles
- 30 bar / ambient
- 50 °C

$NaAlH_4$
- ~100 cycles
- 90 bar
- 110-160 °C

$MgH_2$
- ~500 cycles
- 20 bar
- 300 °C

$Ti_{0.98}Zr_{0.02}V_{0.43}Fe_{0.09}Cr_{0.05}Mn_{1.5}$ + FeV substitution [2]
- 1000 cycles
- 40 bar
- 30°C

[1] Dieterich, M., Pohlmann, C., Bürger, I., Linder, M., & Röntzsch, L. (2015). Long-term cycle stability of metal hydride-graphite composites. *International Journal of Hydrogen Energy*. http://doi.org/10.1016/j.ijhydene.2015.09.013

[2] Ulmer, U., Dieterich, M., Pohl, A., Dittmeyer, R., Linder, M., & Fichtner, M. (2017). Study of the Structural, Thermodynamic and Cyclic Effects of Vanadium and Titanium Substitution in Laves-Phase AB2 Hydrogen Storage Alloys. International Journal of Hydrogen Energy.

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