VSB TECHNICAL UNIVERSITY OF OSTRAVA | ENERGY AND ENVIRONMENTAL TECHNOLOGY CENTRE | ENERGY RESEARCH CENTRE

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Ing. Matěj Charvát

Metastable sodium acetate trihydrate for applications in household-scale energy sector

2. Year Ph.D. student
Faculty of Mechanical Engeneering
Department of Power Engeneering
Energy Researche Centre – CEET

Energy Research Centre – member of the CEET Group

Scope of Scientific Activities

- H_2 Technologies
- Thermochemical Conversion (Gasification, Pyrolysis)
- Catalysis (Synthetic Hydrocarbons, Flue gas purification)
- Industrial Safety Assessment (Explosion Parameters)
- CCUS (Carbonaceous Sorbents, Membrane Separation)
- Waste Management (LCA, Waste Utilisation and Evaluation)
- Combustion technologies (Household heating appliances)

SAT (Sodium acetate trihydrate)

- Advantages
  - Latent heat (205 kJ/kg)
  - Cost (0.5 €/kg)
  - Temperature of melting (58 °C)

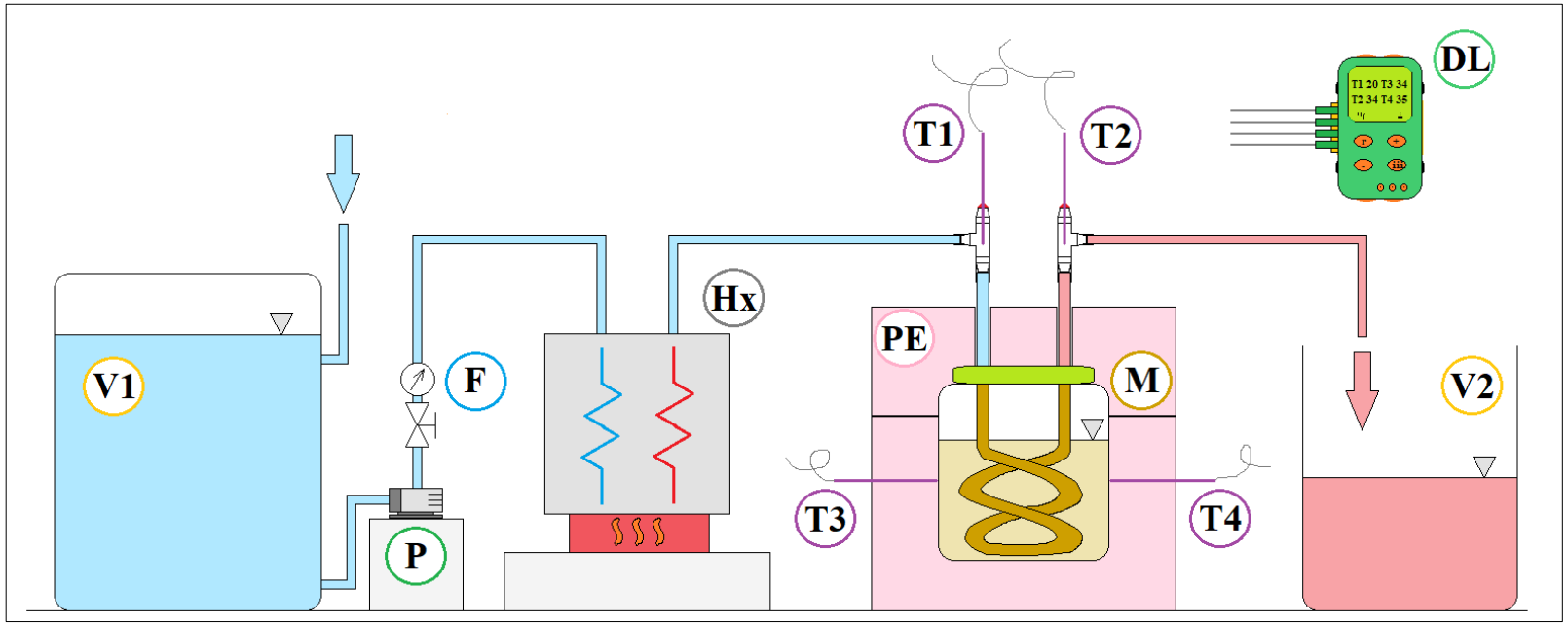
- Disadvantages
  - Density (1.28 l; 1.45 s)
  - Heat flux (0.3 W/(m·K)
  - High reactivity

Problematic factors

- Dirt or inpurities
- Material degradation (solution)
  - Chemical
  - Thermal
- Material degradation (heat exchanger)
  - Chemical
  - Thermal
- Cooling intensity
- Instability of solution

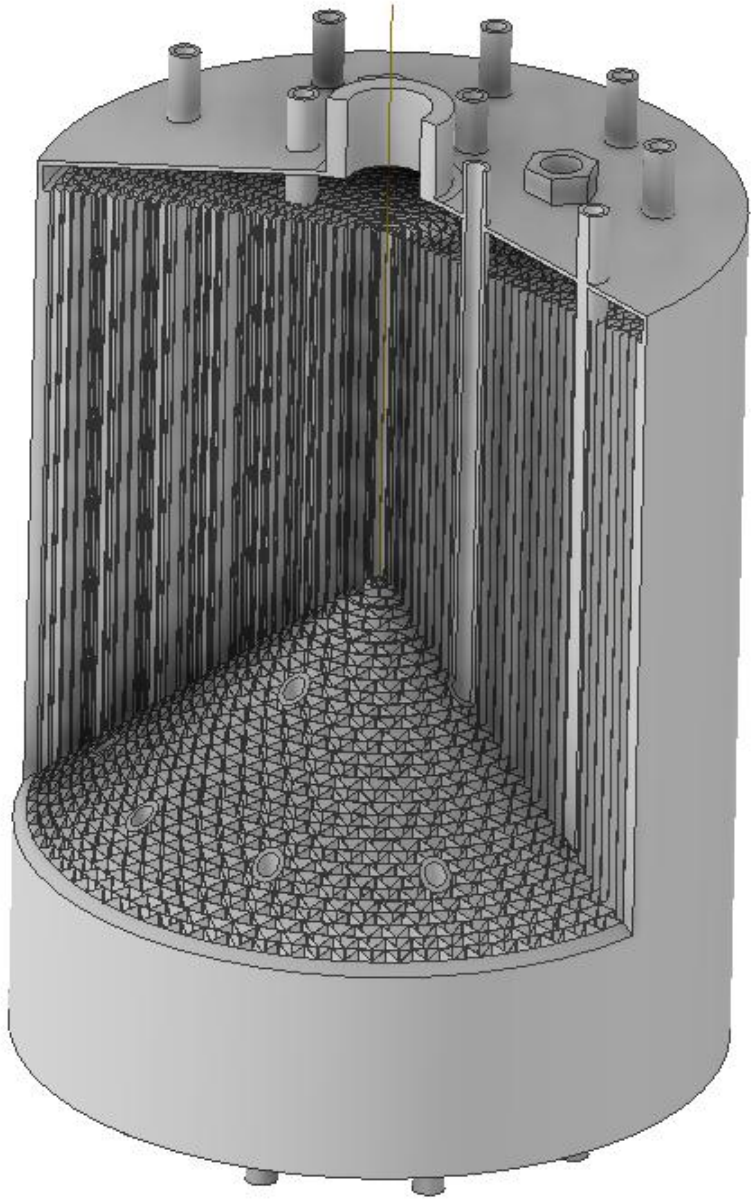
Experimental module – 1st gen.

- Advantages
  - Maintanence
  - Production
  - Cost
- Disadvantages
  - Copper heat exchanger
  - Fragile



Experimental module – 2nd gen.

- More durable
- Closer to real scale application
- Higher heat flux
- Easier initiation proces
- Two variants

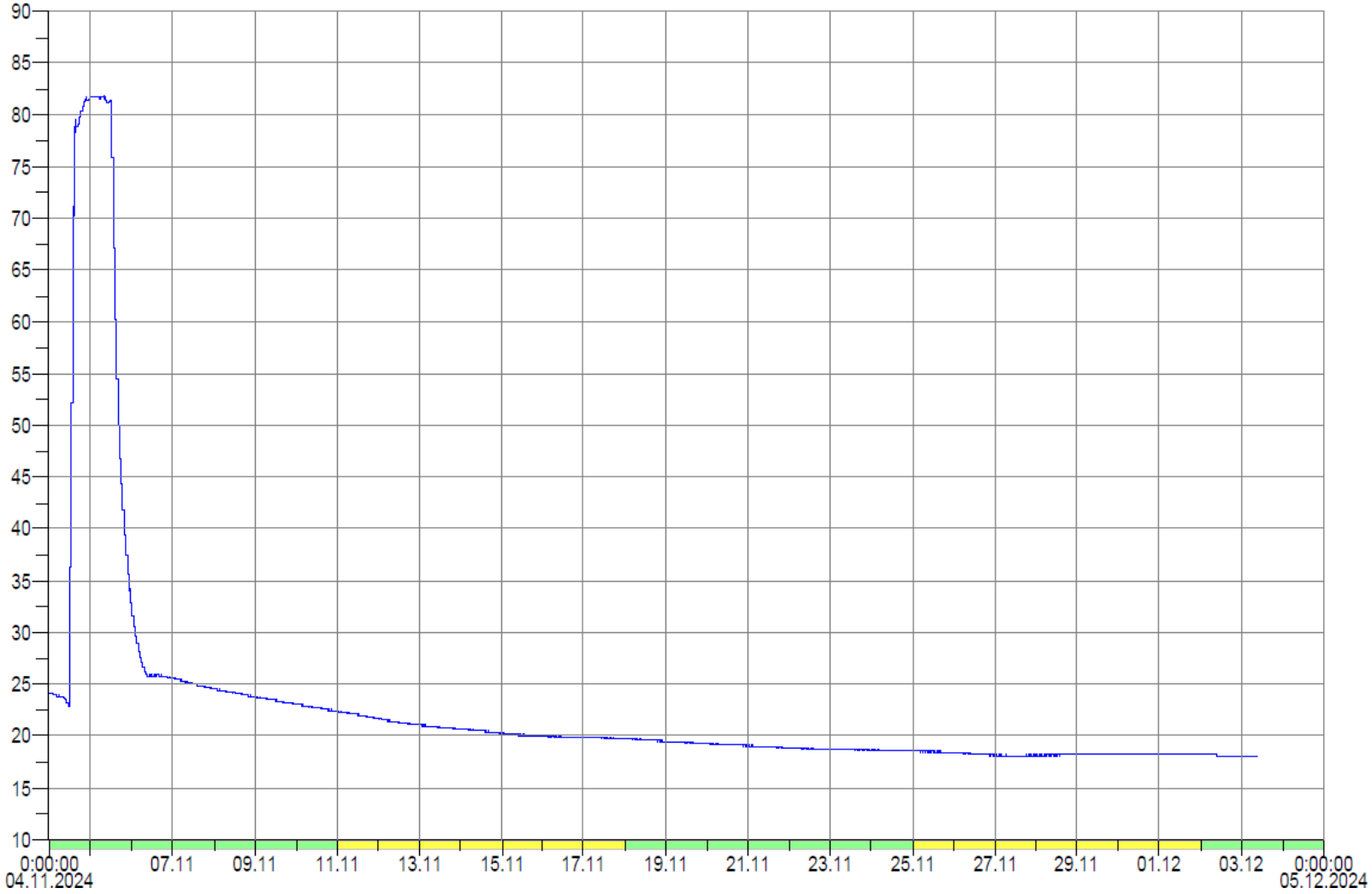


Real scale application – prototype

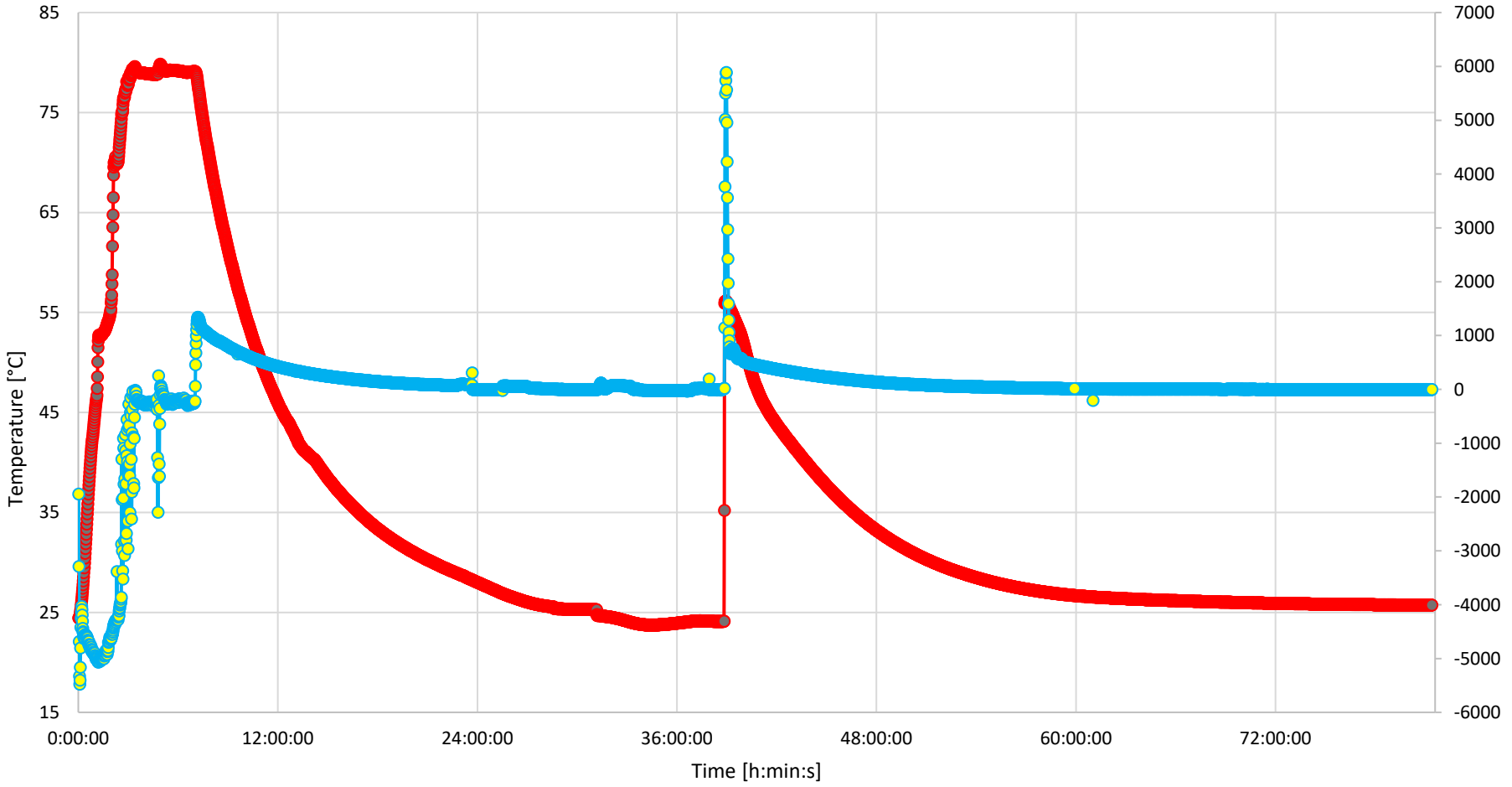
- Stainless steel
- Inner measuring of temperature
- Automatic initiation

Results – only for prototype unit

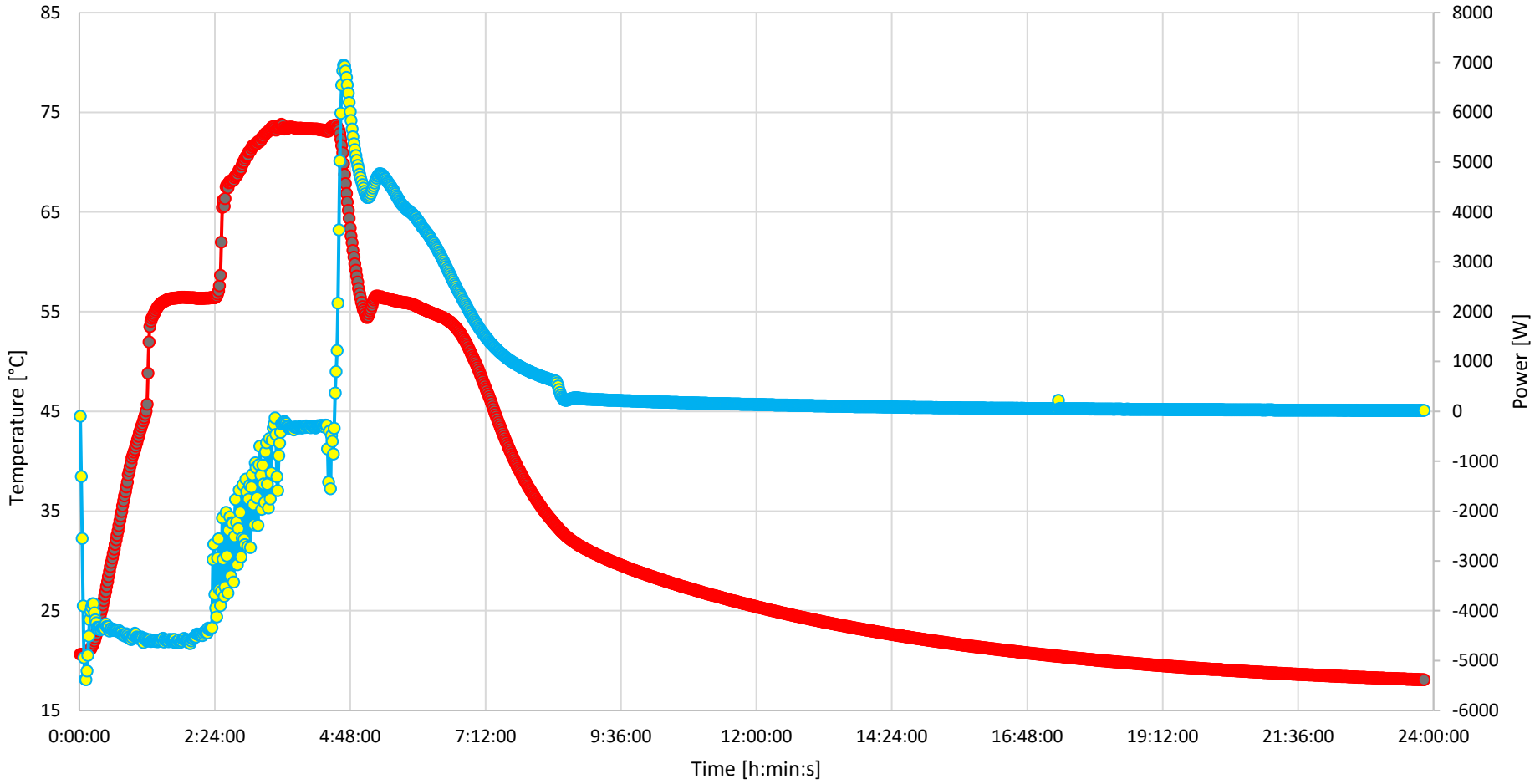
Long-term stability of prototype



Heat cycle of prototype – stable



Heat cycle of prototype – unstable



Conclusions

- Stability of solution
  - Heat cycles
  - Damage of the vessel
- Improving heat flux
  - Solution
  - Heat exchanger
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Thank you for your attention

Ing. Matěj Charvát

+420 596 993 812

matej.charvat@vsb.cz

www.vsb.cz