Research direction – AND research modus operandi

Sorption friends III, Taormina, 4. May 2023

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Where we are ..

In a new world since 2022

- First statement: we are all techies (or research nerds)
- Second statement: Heat was never more in focus of our society
- Third statement: world changed in 2022 towwards out of burning fossils towards renewable electricity
- Not it is not about efficiency and reducing fossile use, it is about safety of supply and getting out of burning fossile fuels
- What does this mean for sorption world?

Research direction

- New cycles, new materials, new applications?

Research topics I

- Chillers / Heat Pumps
  - New cycles
  - Chemisorption for chilling (Bob)
  - Integration with new system (electrolyser etc.), adopt cycles as needed (Belal, Gerrit)
  - Analysis of existing application especially in industries (Walter, Gerrit)
  - Integration with vapour compression cycles (Gerrit), activities already going on but outside sorption community
  - Analysis of heat related industrial processes, several example applications (Srinivas)
  - Hydrogen for heat pumps?
  - High temperatur lift for domestic heat pumps (combined cycle with gas as a booster, Srinivas)
- Heat/cold storage
  - Direct integration of sorption storage with vapour compression cycles (Bob)
  - Integration of storage in heat networks? Joint effort to identify applications with „sorption benefits“ (combined heating and cooling demand)
- Drying (Gerrit, Michel, Srinivas)
  - Analysis im comparison to vapour compression drying (Michel)
  - Various applications with high potential for sorption solutions (Srinivas)

Research topics II

New applications? Water havesting,desalination, CO2 capture, heat transformers

- Steam production with heat transformers
- Water harvesting?
  - No activity in the comunity present here
- Desalination
  - Combined cooling and water purification?
  - Difficult to compete with existing large scale desalination
  - Advantage of sorption: very low driving temperature level that cannot be exploited by conventional desalination (Walter)
    - → check materials/new material with high capacity, low temperature lift (uptake at high p_rel) and fast kinetics
- CO2 capture
  - „new hot topic“?
  - New cycles for DAC, LCA analysis done at RWTH

Research modus operandi

- We need to speed up things
- New forms of cooperation?

- „radical cooperation“

- Using more digital tools for sharing, less fear of loosing rights or whatsoever
  - Regular informal online meeting (1/2 day per 3 month)
    - Has been run sucessfully through Mission Innovation
    - Low profile distributed grassroot funding for backbone structure
    - Using existing MS Teams infrastructure (Steve/Salva)
    - Roation on organisation following a fixed list?
  - Data dropping plattform (?) → needs (some) funding
  - IEA task on sorption heat transformation, storage, chilling, heat pumping for industrial processes?

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