

MM 11 Invited talk Züttel

Time: Tuesday 09:30–10:00

Room: IFW A

Invited Talk

MM 11.1 Tue 09:30 IFW A

The Materials Challenge for Hydrogen Storage — ●ZÜTTEL ANDREAS — University of Fribourg, Physics Department, Pérolles, CH-Fribourg, Switzerland

The intense use of fossil hydrocarbons as energy carriers has caused an increase of CO_2 in the atmosphere. Furthermore, the reserves of fossil fuels on earth are finite and no matter how long they will last, an energy system independent of fossil fuels has to be developed for the future. Hydrogen exhibits the greatest heating value (39.4 kWh/kg) of all chemical fuels. Hydrogen can be produced by electrolysis from renewable energy, and is therefore regenerative and environment friendly. Hydrogen is stored by six different methods:

- high pressure gas cylinders (up to 800 bar)
- liquid hydrogen in cryogenic tanks (at 21 K)
- adsorbed hydrogen on materials with a large specific surface area (at $T < 100K$)
- absorbed on interstitial sites in a host metal (at ambient pressure and temperature)
- chemically bond in covalent and ionic compounds (at ambient pressure)
- oxidation of reactive metals and complex hydrides e.g. *Li*, *Na*, with water

Each method has its specific properties and limitations. The physical boundaries and the potentials will be outlined especially in view of the materials challenges.