FuncHy
functional materials for mobile hydrogen storage

Helmholtz Initiative “FuncHy”

Functional Materials for Mobile Hydrogen Storage

Introduction

Rüdiger Bormann

FuncHy-2010

Wildhaus, Switzerland, Jan. 25, 2010

HELMHOLTZ ASSOCIATION

Frame of the FuncHy Project

Recommendation of the Helmholtz Senate following the evaluation of Helmholtz Programme “Advanced Engineering Materials” (GKSS, 2004)

- A **medium-term strategy** for hydrogen storage (or further reaching hydrogen technology) activities should be outlined, **including the research integrated from the “Nanotechnology” programme** (KIT, 2004) **as well as partners from universities and external institutes**.

Application and funding of the Helmholtz Initiative **FuncHy** (2005)

- **2005 – 2008 (+ 1 $^{3}/_{4}$ year)**
- Total budget **363.000 € / year**
- Financing of **5 postdoc positions**

Positive evaluation of FuncHy after 2 years (2007)

$\Rightarrow$ **prolongation** until September of **2010**

Challenges of a Future Hydrogen Economy

FuncHy
functional materials for mobile hydrogen storage

Hydrogen generation by renewable energy sources

Hydrogen separation and cleaning

Hydrogen transport and infrastructure

Hydrogen storage

Use of hydrogen in fuel cells

Safety aspects

HELMHOLTZ ASSOCIATION

Network of Competence: Hydrogen Technology for Mobile Applications

FuncHy
functional materials for mobile hydrogen storage

EU FP6 IP NESSHY:
Novel Efficient Solid Storage for Hydrogen

EU FP6 MC RTN COSY:
Complex Solid State Reactions for Energy Efficient Hydrogen Storage

EU FP7 FlyHy
Fluorine Substituted High Capacity Hydrides for Hydrogen Storage at low Working Temperatures

EU FP6 MC RTN HYDROGEN

EU FP7 NANOHy
Novel Nanocomposites for Hydrogen Storage Applications

HGF Initiative
Functional Materials for Mobile Hydrogen Storage

Helmholtz Virtual Institute
Asymmetric Structures for Polymer Electrolyte Fuel Cells

vrije Universiteit

GKSS FORSCHUNGSZENTRUM in der HELMHOLTZ GEMEINSCHAFT

KIT Karlsruhe Institute of Technology

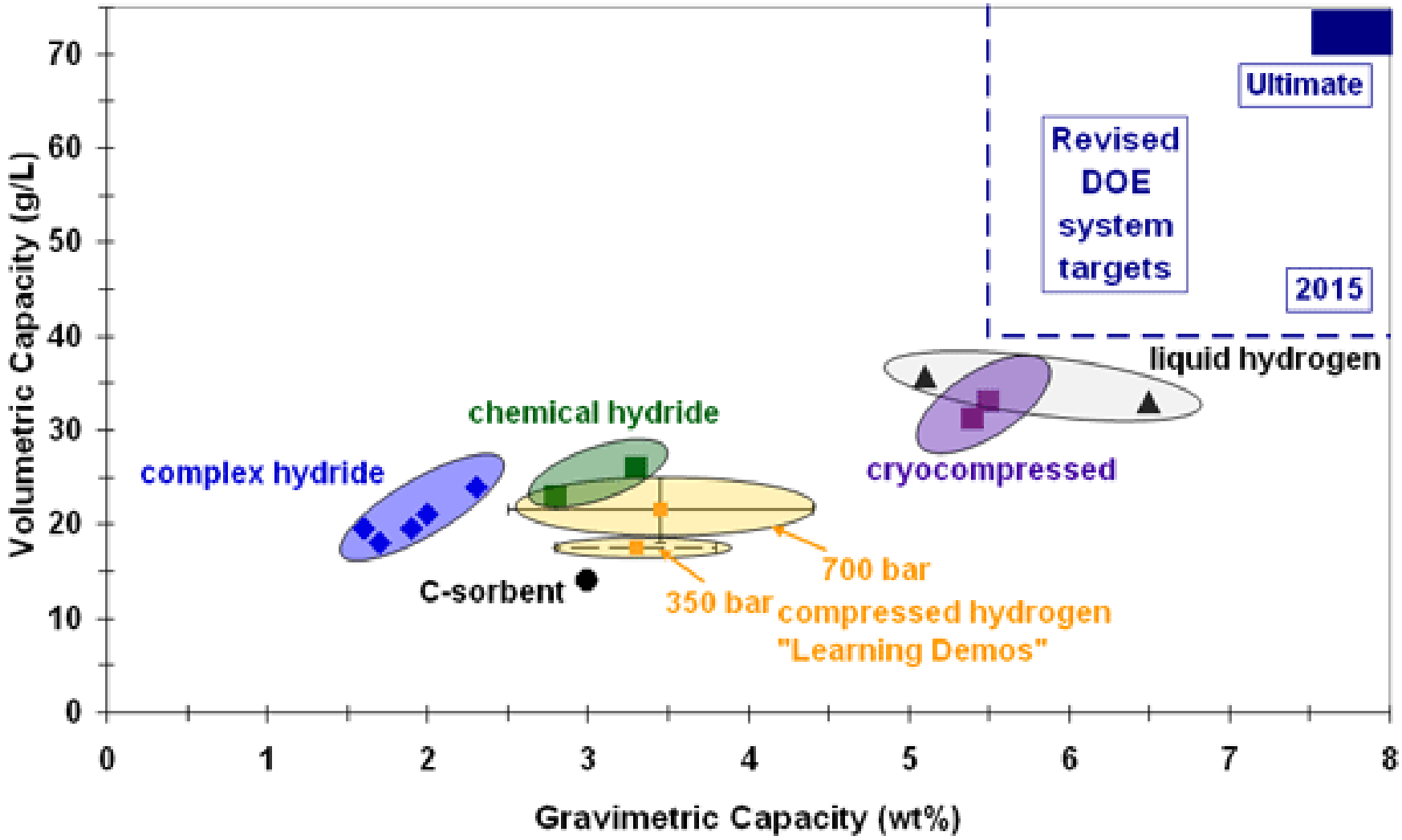
EMPA Materials Science & Technology

IFW Leibniz-Institut für Festkörper- und Werkstoffforschung Dresden

Associated Partners of the Helmholtz Initiative

TU Hamburg-Harburg, Univ. Uppsala, TU Denmark, Univ. Aarhus, IFE Norw., MPI Kohlenf., MPI Metallf., BMW AG, DaimlerChrysler AG, Volkswagen AG, Adam Opel AG/General Motors, DLR IfK, GKSS IfP, FZK IKET

Current Status of H Storage Systems (DOE 1/2010)



http://www.eere.energy.gov/hydrogenandfuelcells/storage/tech_status.html (1/2010)

Scientific and Technical Targets

FuncHy
functional materials for mobile hydrogen storage

- Development of **novel hydrogen storage materials** with a reversible hydrogen capacity of more than **5 wt.%**
- **desorption temperatures of ≤ 150°C** for combination with a new generation of PEM fuel cells and combustion engines
- **optimisation of ab- and desorption kinetics** of storage materials
  ⇒ sorption kinetics not rate limiting for properties of whole storage system
- **Economic production routes** for storage materials

cf: EU IP STORHY, Shell Global Solutions,
Japanese „New Sunshine Project“, US DOE system targets

Project Tasks

FuncHy
functional materials for mobile hydrogen storage

Materials

Alanates (task leader Dr. Maximilian Fichtner, FZK)

Borohydrides (task leader Dr. Philippe Mauron, EMPA)

Amides (task leader Dr. Wiebke Lohstroh, FZK)

Reactive Hydride Composites (task leader Dr. Martin Dornheim, GKSS)

Cross Cutting Tasks

Thermodynamic and Kinetic Characterisation
(task leader Dr. Oliver Gutfleisch, IFW)

Combinatorial Search for Hydrogen Storage Materials
(task leader Dr. Bernard Dam, VU)

System Integration of Selected Hydrogen Storage Materials
(task leader Dr. José Bellosta von Colbe , GKSS)

HELMHOLTZ ASSOCIATION

Following Talks

Matteo Filippi (Vrije Universiteit, Amsterdam) - Light - Weight Sodium Alanate Thin Films grown by Reactive Sputtering

Maximilian Fichtner (KIT, Karlsruhe) - Alanates – Synthesis, Transformation Mechanism and Technical State of the Art

Philippe Mauron (Empa, Dübendorf) - FuncHy: Borohydrides

Jianjiang Hu (KIT, Karlsruhe) - Li-Mg -N-h Hydrogen Storage Systems - Composition Variation , Sorption Properties and Mechanistic Study

Ulrike Bösenberg (GKSS, Geesthacht) - Reaction Pathways and Role of Additives in Reactive Hydride Composites

José Bellosta von Colbe (GKSS, Geesthacht) - System Integration : from Materials Research to Tank System

Talks will be made available for download at http://funchy.gkss.de