
Carbon-based Materials, High Surface Area Adsorbents and Novel Concepts

Rapporteur:
Co-Chairs:

Gavin Walker (University of Nottingham) Session
Mike Heben (NREL)
Richard Chahine (HRI, Universite du Quebec)

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Presentations

- ☛ Main scientific and technical results
 - ☛ Increased hydrogen storage density through metal-assisted systems
 - ☛ Theoretical models predict 9 wt.% in C-based systems
 - ☛ A need to understand factors governing energies of adsorption, design of adsorbents

Presentations

- 6 orals and 14 posters

Materials covered

- CNTs, GNFs, MOFs, Zeolites, Inorganic Nanotubes, Conducting Polymers
- improved metal hydride kinetics with carbon nanotube incorporation

Characterisation papers

- Neutron Inelastic Scattering, Proton NMR, Anelastic properties

Theoretical papers

- Hydrogen interactions with CNTs, Kubas-type complexes, C-M-H complexes

Summary of ongoing or proposed collaborations

- ☞ **Metal-CNT multicomponent systems.** H-M Cheng (Institute of Materials Research, China) – GQ Lu (University of Queensland, Australia)
- ☞ **Neutron Inelastic Scattering.** K Ross (University of Salford, UK) – D Colgnesi (CNR, Italy) – ISIS
- ☞ **Hydrogen Storage in GNFs.** GS Walker (University of Nottingham, UK) – H Fujii (University of Hiroshima, Japan)
- ☞ **Dynamic Gas Adsorption in CNTs.** A Paolone (University of Rome, Italy) – S Roth (Max Planck Institute, Germany)
- ☞ **Metal-assisted CNTs.** R Chahine (HRI, Canada) – M Heben (NREL, US)

Potential new collaboration areas

- Combining theoretical models and experimental results for C-based materials
- Experimental design to validate new theoretical predictions
- C and MH communities collaborating to understand and develop new M-assisted hydrogen interactions
- New experimental techniques (Cantelli)

Focus of discussion session

- Role of carbon in M-assisted C systems (unreactive support *vs.* synergistic interactions)
- Potential for organic metals
- MOFs research to move towards novel ligand chemistry to increase hydrogen sorption interactions, as opposed to just more surface area
- MOFs - oxide tetrahedral *vs.* organic linker

New potential collaborations

- SWNT system design.
NREL + HRI
- M-assisted carbon based materials
Nottingham + NREL + Oak Ridge + ?
- Modified C-based systems
HRI + Max Planck + Caltech
- Thermal management in MH systems with NTs (H.M. Cheng, NREL)
- Anelastic spectroscopy (Cantelli, NREL)
- B, N substitutional ,theory and expt (various)