

## Hydrogen Separations and Purification Working Group (PURIWG) Kick-Off & Hydrogen Production Technical Team Research Review

### Meeting Action Items and Highlights

November 7, 2007

#### Action Items:

- Brian James (DTI: Cost Analysis Work) will complete a detailed engineering case study of a membrane reactor for forecourt hydrogen production by the end of FY 08.
- Researchers are encouraged to provide Brian with pertinent data in order for him to understand and model the benefits of membrane systems to assist DOE with the go/no decision on membrane reactors next year.
- Researchers need to provide more data on performance and durability using realistic feeds and contaminants in the next AMR review. (HPTT)
- Please make sure to use the appropriate figures of merit in all reports. (DOE and HPTT)

#### Highlights:

- Satish Tamhankar, Linde: “Integrated Hydrogen Production, Purification, and Compression System”
  - Innovative reactor system that integrates a fluidized bed with a membrane separations and a chemical hydride compressor
  - Due to the fluidized bed they need lots of on stream data to show that catalyst attrition, membrane durability.
- Scott Hopkins and Rick Kleiner, Pall Corporation: “High Performance, Durable, Palladium-Alloy Membrane for Hydrogen Separation and Purification”
  - Porous metal tube with solid fittings welded on each end. deposit 70nm ZrO<sub>2</sub> on it, then deposit 20-30 um Pd alloy membrane. The solid fittings make this membrane easy to integrate into systems and avoids many embrittlement problems common to metal membranes.
  - Pd alloy is <3um thick which reduces cost.
- Hendrik Verweij, University of Cincinnati and Arizona State University: “Ultra-thin Supported Inorganic Membranes”
  - Can make membranes 50nm thick.
  - To be cost effective the manufacturing steps need to be less than 1 minute each. If it is longer it will be too expensive for mass volume manufacturing.