Synthesis of Novel Nanostructured Metal Hydride Materials

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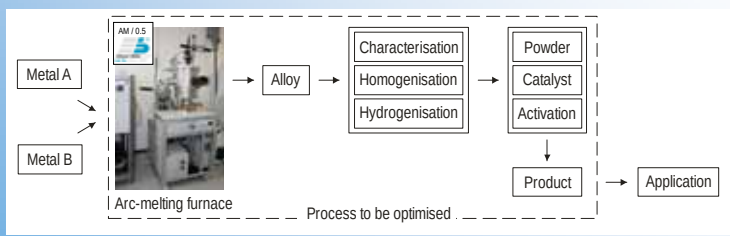
Background

Institute for Energy technology (IFE) in Norway possesses long-term research experience on metal hydrides (MH), from fundamental understanding of hydrogen-metal interactions to their use in experimental hydride-based energy systems. Based on this unique expertise and knowledge, Hydrogen Storage & Systems (HYSTORSYS) was founded ultimo 2005. HYSTORSYS aims at development and manufacturing of efficient, safe, and sustainable hydrogen (H) energy storage and compression systems based on metal hydrides.

Objective

Together, HYSTORSYS and IFE runs a project on development of efficient technologies for production of MH-materials for hydrogen energy applications. The project, which is supported by the Research Council of Norway (NFR), focuses on:

- Easy and robust routes from initial components – via alloys – to powdered metal hydrides – and final products;
- Use of inexpensive components, thus providing a potential to offer a significant price reduction during the mass manufacturing;
- Targeted on different key applications, including hydrogen storage and compression materials for:
  - Stationary H storage and compression purposes;
  - Transportation and mobile demonstration projects with hydrogen as energy carrier;
  - Portable applications (battery replacement).



Expected outcome

The main expected outcomes of the project are:

- A set of fine-tuned and verified procedures for synthesis of novel nanostructured MH-materials for thermally managed hydrogen storage and compression purposes;
- Hydrogen supply systems elaborated on the basis of the advanced in-house developed and produced metal hydride materials.

Method

Trough this project, IFE and HYSTORSYS wish to optimise the alloy synthesis and modification process resulting in the desired characteristics of the metal hydrides, which is of key importance for making high-quality hydride-based devices in the end. Thus, the properties and the quality of the materials synthesised will be characterised, analysed, and optimised involving techniques such as thermal desorption spectroscopy (TDS), Pressure-Composition-Temperature isotherms (PCT), X-ray diffraction (XRD), scanning electron microscopy (SEM), and in situ synchrotron X-Ray and neutron powder diffraction (NPD). IFE's expertise and activities on synthesis of advanced nanostructured MH, covered in a number of presentations at MH2008 [1-3], will be extensively utilised in in this project and future common activities between HYSTORSYS and IFE.

References

1. Combustion-type hydrogenation of nanostructured Mg-based composites – M.V. Lototsky, R.V. Denys, and V.A. Yartys, MH2008.
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Acknowledgement

The authors would like to thank all the collaboration parties and express their gratitude to the Research Council of Norway (NFR) for supporting the project:

The Research Council of Norway

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