

Preface to Project Publications List and Reports

The pages that follow give details of the technical results obtained during Task 12. They consist of a **List of Publications and Presentations** resulting from each project, followed by brief individual **Project Reports**.

The List of Publications and Presentations was compiled from inputs provided by the Project Leaders. They represent publications or presentations that were completely or at least partially derived from IEA Task 12 work. [PU] indicates a publication and [PR] a presentation. There are a few patents, included as publications. The list is long, on the order of 150 entries, and represents an impressive measure of the scientific and technological contributions made to the hydride and carbon communities by this 5-year IEA effort.

A publication quality formal Report is included for each Project. They are largely as submitted by the Project Leaders. They were edited only for general form and obvious typographical errors, so they faithfully represent the work and conclusions of the authors. The 2-8 page reports either broadly summarize the accomplishments of the projects or focus on one or two key technical findings. In either case, they generally do not cover all the results derived from a given project. The Publications List will allow the reader to seek more detail.

All 20 projects are represented here. The Operating Agent is grateful to the Project Leaders and associates for the 100% participation in this Task Final Report.

List of Task 12 Publications and Presentations

[PU] = Publication; [PR] = Presentation

• Project 1: Destabilized Magnesium Nickel Hydride [Leader: D. Noréus (Sweden)]

E. Rønnebro, D. Noréus, K. Tanaka and G. Thomas: "Destabilized Mg_2NiH_4 ", Poster Paper, Gordon Research Conference on Hydrogen-Metal Systems, Henniker, NH, USA, July 13-18, 1997 [PR]

D. Noréus: "R&D and commercial activities of Ni-MH batteries in Europe and new Mg-based hydrogen storage alloys", Special Symposium, The Research Association for the Development and Application of Metal-Hydrogen Systems, Tokyo, Japan, Oct. 2, 1998 [PR]

E. Rønnebro, J.O. Jensen, D. Noréus and N. Bjerrum: "Distorted Mg_2NiH_4 formed by mechanical grinding", International Symposium on Metal-Hydrogen Systems, Fundamentals and Applications, Hangzhou, China, Oct. 4-9, 1998, J. Alloys and Compounds, **293-295** (1999) 146-149 [PR+PU]

E. Rønnebro: "Structural Investigations of Some Ternary Metal Hydrides", Doctoral Dissertation, Dept. of Structural Chemistry, Stockholm University, 1999 [PU]

D. Noréus: "Hydrogen - a stabilizing ligand in formal low valent transition metal complexes" Oral Presentation, Gordon Research Conference on Hydrogen Metal Systems, July 22, 1999 [PR]

M. Olofsson-Mårtensson, M. Kritikos and D. Noréus: "A Novel Tetrahedral Formally Zerovalent-Palladium Hydrido Complex Stabilized by Divalent Alkaline Earth Counterions", J. American Chem. Soc., **121** (1999) 10908-10912 [PU]

M. Olofsson-Mårtensson, U. Häussermann, J. Tomkinson and D. Noréus: "Stabilization of Electron-Dense Palladium-Hydrido Complexes in Solid State Hydrides", J. American Chem. Soc., **122** (2000) 6960-6970 [PU]

H. Blomqvist, E. Rønnebro, D. Noréus and T. Kuji: "Destabilization of Mg_2NiH_4 and its zero valent $[NiH_4]$ -complex by lattice manipulations", MH2000, Noosa, Australia, Oct. 1-6, 2000, J. Alloys and Compounds, in press [PR+PU]

E. Wikstad, M. Kritikos and D. Noréus: "Phase diagram of the Na- Na_2PdH_2 system", MH2000, Noosa, Australia, Oct. 1-6, 2000, J. Alloys and Compounds, in press [PR+PU]

•Project 2: Vapor Phase Synthesized Mg_2Ni [Leader: G. Thomas (USA)]

G. Thomas: "Hydrogen Storage Development", U.S. DOE 1997 Hydrogen Program Review, Herndon, VA, May 21-23, 1997 [PR]

G. Thomas and K. Gross: "The state of R&D on metal hydrides in USA", Special Symposium, The Research Association for the Development and Application of Metal-Hydrogen Systems, Tokyo, Japan, Oct. 2, 1998 [PR]

G. Thomas and S. Guthrie: "Hydrogen Storage Development", 1998 U.S. DOE Hydrogen Program Annual Review, Alexandria, VA, April 28-29, 1998, Proc., NREL/CP-570-2531, p.419 [PR+PU]

S.E. Guthrie and G.J. Thomas: "A Novel Process for Fabricating Mg₂Ni", 43rd Annual SAMPE Symposium, Society for the Advancement of Materials and Process Engineering, Anaheim, CA., May 31-June 4, 1998, to be published in Proceedings [PR]

S.E. Guthrie, G.J. Thomas, D. Noréus and E. Rönnebro: "Properties of Mg₂NiH₄ at 450-570K", Spring 98 Meeting of the Materials Research Society, San Francisco, April 13-17, 1998, published in Mat. Res. Soc. Symp. Proc. Vol. 513, 1998, pp. 93-98 [PR+PU]

S.E. Guthrie, G.J. Thomas, W. Bauer, N.Y.C. Yang: "Synthesis of alloys with controlled phase structure", U.S. Pat. 5,895,518, April 20, 1999 [PU]

•Project 3: Fine-Structured RE(Mn,Al)₂ Alloys [Leader: L. Schlapbach (Switzerland)]

P. Spatz: "Neue Legierungen zur Speicherung von Wasserstoff", Doctor's Dissertation, Universität Freiburg (CH), Diss. No. 1148, 1997 [PU]

P. Spatz, K. Gross, A. Züttel, F. Fauth, P. Fischer and L. Schlapbach: "CeMnAlH_x, a New Metal Hydride", J. Alloys and Compounds, **261** (1997) 263-268 [PU]

K. Gross, A. Züttel and L. Schlapbach: "Intermetallic Materials for Hydrogen Storage", Poster Paper, Spring 98 Meeting of the Materials Research Society, San Francisco, April 13-17, 1998 [PR]

K.J. Gross, D. Chartouni, F. Fauth "A new hexagonal Laves phase deuteride CeMn_{1.5}Al_{0.5}D_x (0<x<4) Investigation by in situ neutron diffraction", J. Alloys and Compounds, **306** (2000) 203-218 [PU]

K.J. Gross: "Intermetallic Materials for Hydrogen Storage", Doctor's Thesis, Faculté des Sciences, Université de Fribourg (Suisse), 1998 [PU]

•Project 4: Laves Phase CaAl_{2-b}X_b Alloys with Substitutional and Interstitial Elements X [Leader: I. Uehara (Japan)]

H. Tanaka, D. Noréus, H.T. Takeshita, N. Kuriyama, T. Sakai and I. Uehara: "Crystal structure and hydrogenation characteristics of Ca-Al-Si alloys", International Symposium on Metal-Hydrogen Systems, Fundamentals and Applications, Hangzhou, China, Oct. 4-9, 1998 [PR]

H. Tanaka, H. Miyamura, D. Noréus, N. Kuriyama, H. T. Takeshita, T. Sakai and I. Uehara: Structure and hydrogen storage property of (Ca,La)(Al,Si)₂-based system", Rare Earths, **32** (1998), 166 [PR+PU]

H. Tanaka, H. Miyamura, N. Kuriyama, T. Sakai and I. Uehara: "Calcium-aluminum system hydrogen absorbing alloy" U.S. Patent 5,803,995, Sep. 8, 1998 [PU]

H. Tanaka, H. Miyamura, N. Kuriyama, T. Sakai and I. Uehara: "Hydrogen storage material consisted from Ca-Al system alloy", Japan Patent No. 2972847 (Sep. 1999) [PU]

H. Tanaka, H. T. Takeshita, T. Sakai, I. Uehara and D. Noréus: "ABC-type hydrogen storage alloys and process for production thereof", Japan Patent No. 3000146 (Nov. 1999) [PU]

•Project 5: Preparation and Characterization of Titanium-Aluminum Alloys as Potential Catalysts for Reversible Alkali Metal - Aluminum Hydrides [Leader: A. Maeland (Norway)]

A.J. Maeland, B. Hauback, M. Sørby and H. Fjellvåg: "Neutron Diffraction Studies of the Ti_3Al/D System", HYPOTHESIS II, Grimstad, Norway, August 18-22, 1997, Hydrogen Power: Theoretical and Engineering Solutions, T.O.Saetre, Ed., Kluwer Academic (1998) 337-342 [PR+PU]

A.J. Maeland, B. Hauback, H. Fjellvåg and M. Sørby: "The Structures and Hydride Phases in the Ti_3Al/H System", 5th International Conference "Hydrogen Materials Science and Chemistry of Metal Hydrides", Katsiveli, Yalta, Ukraine, September 2-8, 1997 [PR]

M. Sørby, A.J. Maeland, B. Hauback and H. Fjellvåg: "Preliminary Neutron Diffraction Studies of the Ti_3Al/D System", Poster Paper, Norwegian Physical Society Meeting, Rondablikk, Norway, September 11-14, 1997 [PR]

A.J. Maeland, B.C. Hauback, H. Fjellvåg and M. Sørby, "The Structure of Hydride Phases in the Ti_3Al/H System", *Int. J. Hydrogen Energy*, **24** (1999) 163-168 [PU]

•Project 6: Structural Investigations of Intermediates and End Products in the Synthesis of Ti-Doped Alkali Metal - Aluminum Hydrides [Leader: D. Noréus (Sweden)]

E. Rönnebro, D. Noréus and B. Bogdanovic': "Structural Studies of Na_3AlH_6 ", Poster Paper, Gordon Research Conference on Hydrogen-Metal Systems, Henniker, NH, USA, July 13-18, 1997 [PR]

B. Bogdanovic': "Introduction to Catalyzed Alanates", Oral Presentation, Gordon Research Conference on Hydrogen Metal Systems, July 22, 1999 [PR]

E. Rönnebro, D. Noréus, K. Kadir, A. Reiser and B. Bogdanovic': "Investigation of the perovskite related structures $NaMgH_3$, $NaMgF_3$ and Na_3AlH_6 ", *J. Alloys and Compounds*, **299** (2000) 101-106 [PU]

•Project 7: Comprehensive Hydride Review and Associated IEA Databases [Leader: G. Sandrock (USA)]

G. Sandrock, G. Thomas and T. Pope: "IEA/DOE/SNL Hydride Materials Listing and Reference Databases", Jan. 1997, Sandia National Laboratories Hydrogen Information Center, URL: <http://hydpark.ca.sandia.gov> [PU]

Task 12 Experts: "IEA 12 - An International Partnership for Hydride R&D", Poster Paper at National Hydrogen Association Annual Meeting, Alexandria, VA, March, 1997 [PR]

G. Sandrock: "IEA TASK 12 - An International Partnership for Hydride R&D", Poster Paper, Gordon Research Conference on Hydrogen-Metal Systems, Henniker, NH, USA, July 13-18, 1997 [PR]

A.J. Maeland: "IEA TASK 12 - An International Partnership for Hydride R&D", Poster Paper, HYPOTHESIS II, Grimstad, Norway, August 18-22, 1997 [PR]

G. Sandrock and G. Thomas: "Compilation of IEA/DOE/SNL Hydride Databases", IEA Technical Report IEA/H2/A12-97, September, 1997 [PU]

G. Sandrock: "A panoramic overview of hydrogen storage alloys from a gas reaction point of view", International Symposium on Metal-Hydrogen Systems, Fundamentals and Applications, Hangzhou, China, Oct. 4-9, 1998, J. Alloys and Compounds, **293-295** (1999) 877-888 [PR+PU]

G. Sandrock: "Metal hydrides and carbon for hydrogen storage: International R&D program under IEA Task 12", International Symposium on Metal-Hydrogen Systems, Fundamentals and Applications, Hangzhou, China, Oct. 4-9, 1998, [PR]

G. Sandrock and G. Thomas: "Metal Hydrides and Carbon for Hydrogen Storage: International R&D Activities under Task 12 of the IEA Hydrogen Implementing Agreement", Proc. 9th Canadian Hydrogen Conference, Canadian Hydrogen Association, 1999, pp.94-103 [PR+PU]

S. Mitrokhin: "Metal hydrides - properties and practical applications. Review of the work in Russia", Oral Presentation, Gordon Research Conference on Hydrogen Metal Systems, July 20, 1999 [PR]

G. Sandrock and G. Thomas: "The IEA/DOE/SNL hydride databases", Applied Physics A (to be published, Feb. 2001 special issue) [PU]

•Project 8: Mechanical Destabilization of Metal Hydrides [Leader: A. Zaluska (Canada)]

L. Zaluski, A. Zaluska, M. Grudnicki and J.O. Ström-Olsen: "Mechanical Destabilization of Metal Hydrides", Poster Paper, Gordon Research Conference on Hydrogen-Metal Systems, Henniker, NH, USA, July 13-18, 1997 [PR]

L. Zaluski, A. Zaluska and J.O. Ström-Olsen: "Synergy of hydrogen sorption in ball milled hydrides of Mg and Mg₂Ni", J. Alloys and Compounds, **289** (1999) 197-206 [PU]

A. Zaluska, L. Zaluski and J. Ström-Olsen: "Metal Hydrides for Hydrogen Storage", Proc. 9th Canadian Hydrogen Conference, Canadian Hydrogen Association, 1999, pp.648-655 [PR+PU]

•Project 9: Ball Milling Under Reactive Atmosphere [Leader: E. Akiba (Japan)]

H. Enoki, E. Akiba and P. Tessier: "Ball Milling of Mg₂Ni under Hydrogen", Japan Institute of Metals Spring Meeting, March 26, 1997 [PR]

H. Enoki, E. Akiba and P. Tessier: "Rietveld analysis of ball-milled Mg₂Ni under hydrogen", Japan Institute of Metals Fall Meeting, September 25, 1997 [PR]

P. Tessier, H. Enoki, M. Bououdina and E. Akiba: "Ball-milling of Mg₂Ni under hydrogen", J. Alloys and Compounds, **268** (1988) 285-289 [PU]

E. Akiba and P. Tessier: "Catalyzed reactive milling", International Symposium on Metal-Hydrogen Systems, Fundamentals and Applications, Hangzhou, China, Oct. 4-9, 1998, J. Alloys and Compounds, **293-295** (1999) 400-402 [PR+PU]

H. Enoki, P. Tessier and E. Akiba: "Ball milling of Mg₂Ni under hydrogen", International Symposium on Metal-Hydrogen Systems, Fundamentals and Applications, Hangzhou, China, Oct. 4-9, 1998, [PR]

P. Tessier, E. Akiba: "Decomposition of nickel-doped magnesium hydride prepared by reactive mechanical alloying", J. Alloys and Compounds, **302** (2000), 215-217

•**Project 10: Application of Polyhydride Catalysts to Sodium Aluminum Hydrides** [Leader: C. Jensen (USA)]

C. Jensen: "Hydrogen Storage via Polyhydride Complexes", 1998 U.S. DOE Hydrogen Program Annual Review, Alexandria, VA, April 28-29, 1998, Proc., NREL/CP-570-25315, p.449 [PR+PU]

R. A. Zidan, S. Takara, A. G. Hee, and C. M. Jensen: "Hydrogen Cycling Behavior of Zirconium and Titanium-Zirconium Doped Sodium Aluminum Hydride", J. Alloys and Compounds, **285** (1999) 119-122 [PU]

C. M. Jensen, R. Zidan, N. Mariels, A. Hee, and C. Hagen: "Advanced Titanium Doping of Sodium Aluminum Hydride: Segue to a Practical Hydrogen Storage Material?" International Journal of Hydrogen Energy, **24** (1999) 461-465 [PU]

C. Jensen: "Na-Al based alloys as a potential hydrogen storage medium", Special Symposium, The Research Association for the Development and Application of Metal-Hydrogen Systems, Tokyo, Japan, Oct. 2, 1998 [PR]

R.A. Zidan, S. Takara, A.G Hee and C.M. Jensen: "Hydrogen cycling behavior of zirconium and titanium-zirconium doped sodium aluminum hydride", International Symposium on Metal-Hydrogen Systems, Fundamentals and Applications, Hangzhou, China, Oct. 4-9, 1998, [PR]

•**Project 11: High-Pressure Synthesis of New Hydrogen Storage Materials** [Leader: K. Yvon (Switzerland)]

K. Yvon: "New metal hydrides", International Symposium on Metal-Hydrogen Systems, Fundamentals and Applications, Hangzhou, China, Oct. 4-9, 1998, [PR]

M. Bortz, B. Bertheville, K. Yvon, E.R. Movlaev, N. Verbetsky and F. Fauth: "Mg₃MnH₇, Containing the First Known Hexahydridomanganese(I) Complex", J. Alloys and Compounds, **279** (1998) L8-L10 [PU]

K. Yvon: "Complex Transition Metal Hydrides", in Advanced Materials in Switzerland, Chimia, **52** (1998) 613-619 [PU]

M. Bortz, A. Hewat and K. Yvon: "The Crystal Structure of Rb₂MgH₄ and Rb₃MgH₅ by Neutron Powder Diffraction", J. Alloys and Compounds, **268** (1998) 173-176 [PU]

F. Gingl, T. Vogt, E. Akiba and K. Yvon: "Structure Refinement of Rb₄Mg₃D₁₀ on Neutron Powder Diffraction Data", J. Alloys and Compounds, **284** (1999), L4-L6 [PU]

F. Gingl, T. Vogt, E. Akiba and K. Yvon: "Cubic CsCaH₃ and Hexagonal RbMgH₃: New Examples of Fluoride-Related Perovskite-Type Hydrides", J. Alloys and Compounds, **282** (1999), 125-129 [PU]

M. Bortz, M. Gutmann and K. Yvon: "Synthesis and Structure Determination of the First Ternary Cadmium Hydride, Cs₃CdH₅", J. Alloys and Compounds, **285** (1999), L19-L21 [PU]

M. Bortz, B. Bertheville, G. Böttger and K. Yvon: "Structure of the High Pressure Phase gamma-MgH₂ by Neutron Powder Diffraction", J. Alloys and Compounds, **287** (1999), L4-L6 [PU]

B. Bertheville and K. Yvon: "High-pressure synthesis and crystal structure of Sr₂MgH₆", J. Alloys and Compounds, **288** (1999), 197-199 [PU]

- B. Bertheville and K. Yvon: "Ca₁₉Mg₈H₅₄, a new salt-like ternary hydride", J. Alloys and Compounds, **290** (1999) L8-L10 [PU]
- P. Hollmuller, J.-M. Joubert, B. Lachal and K. Yvon: "Evaluation of a 5 kWp Photovoltaic Hydrogen Production and Storage Installation for a Residential Home in Switzerland", Int. J. Hydrogen Energy, **25** (2000) 97-109 [PU]
- B. Huang, F. Gingl, F. Fauth, A. Hewat and K. Yvon: "New Tetragonal Metal Hydrides BaMg₂TH₈ (T = Ru,Os) Containing Octahedral [TH₆]⁴⁻ Complex Anions and Hydride Anions", J. Alloys and Compounds, **248** (1997) 13-17 [PU]
- M. Bortz, A. Hewat and K. Yvon: "Synthesis and Structure Determination of Complex Zinc Hydrides, Part 4: Trirubidium and Tricaesium Tetrahydrido-zincate (II) Hydride, Rb₃ZnH₅ and Cs₃ZnH₅", International Symposium on Metal-Hydrogen Systems, Fundamentals and Applications, Les Diablerets, Switzerland, August, 1996, J. Alloys and Compounds, **253-254** (1997), 13-16 [PR+PU]
- F. Gingl, A. Hewat and K. Yvon: "Orthorhombic Ba₆Mg₇H₂₆: a New Fluoride-Related Ternary Alkaline Earth Hydride", International Symposium on Metal-Hydrogen Systems, Fundamentals and Applications, Les Diablerets, Switzerland, August, 1996, J. Alloys and Compounds **253-254** (1997), 17-20 [PR+PU]
- F. Gingl, L. Gelato and K. Yvon: "The Hydride Fluoride Crystal Structure Database, HFD", International Symposium on Metal-Hydrogen Systems, Fundamentals and Applications, Les Diablerets, Switzerland, August, 1996, J. Alloys and Compounds **253-254** (1997), 286-290 [PR+PU]
- F. Gingl, K. Yvon, T. Vogt and A. Hewat: "Synthesis and Crystal Structure of Tetragonal LnMg₂H₇ (Ln = La, Ce), Two Laves Phase Hydride Derivatives Having Ordered Hydrogen Distribution", International Symposium on Metal-Hydrogen Systems, Fundamentals and Applications, Les Diablerets, Switzerland, August, 1996, J. Alloys and Compounds **253-254** (1997), 313-317 [PR+PU]
- B. Bertheville, P. Fischer and K. Yvon: "High pressure synthesis and crystal structures of new ternary cesium magnesium hydrides CsMgH₃, Cs₄Mg₃H₁₀ and Cs₂MgH₄", MH2000, Noosa, Australia, Oct. 1-6, 2000, J. Alloys and Compounds, in press [PR+PU]

•**Project 12: Ball Milling Effects During Fluorination of the Eutectic Alloy Mg-Mg₂Ni** [Leader: S. Suda (Japan)]

- S. Suda, Z.-P. Li, Y.-M. Sun, B.-H. Liu and X.-P. Gao: "Surface Passivation of Metal Hydrides for Applications", MRS Spring Meeting, San Francisco, CA, USA, April, 15-16, 1998, Hydrogen in Semiconductors and Metals, MRS Proc. Vol. **513**, 1998, pp. 25- 36 [PR+PU]
- S. Suda: "Studies on the Design of Protium Inductive Surface", The 1999's Start-up Meeting of Protium Functions in Sub-nano Materials (Ministry of Education), July 29-30, 1999, Fukuoka, Japan [PR]
- S. Suda: "Catalytic Generation of Hydrogen from Metal Hydride Solutions", International Symposium on Protium New Function, Sep. 16-17, 1999, Osaka, Japan [PR]
- S. Suda: "Hydrogen Storage by Light-weight Liquid Hydrides", The Research Association for the Development and Application of Metal-Hydrogen Systems, Toyama, Japan, Nov. 19, 1999 [PR]

S. Suda; "Studies on the Design of Protium Inductive and Catalytic Surface", The 1999's Final Report Meeting of Protium Functions in Sub-nano Materials (Ministry of Education), Tokyo Japan, Jan. 20-21, 2000 [PR]

S. Suda, "Metal-Hydrogen Complex Ions as High H-Capacity Storage Materials and Their Application to Fuel Cells", The 10th Canadian Hydrogen Conference, Quebec, Canada, May 28-31, 2000 [PR]

S. Suda, Y.-M. Sun, B.-H. Liu, Y. Zhou, K. Arai, S. Morimitsu, M. Uchida, N. Tsukamoto, Y. Candra, and Z.-P. Li: "Catalytic Generation of Hydrogen by Applying Fluorinated-Metal Hydrides as Catalysts", Applied Physics A (to be published, Feb. 2001 special issue) [PU]

S. Suda: "Studies on the Design of Protium Inductive & Catalytic Surface", The 2000's Start-up Meeting of Protium Functions in Sub-nano Materials (Ministry of Education), July, 24-26, 2000, Hiroshima, Japan [PR]

S. Suda, B.-H. Liu, Y. Zhou, S. Morimitsu, K. Arai, N. Tsukamoto, M. Uchida, Y. Candra, Z.-P. LI, and Y.-M, Sun: "Aqueous Metal-hydrogen Systems for Hydrogen Storage", MH2000, Noosa, Australia, Oct. 1-6, 2000, J. Alloys and Compounds, in press [PR+PU]

S. Suda, Z.-P. Li, Y.-M. Sun, M. Uchida, B.-H. Liu, S. Morimitsu, K. Arai, Y. Zhou, N. Tsukamoto, Y. Candra: "Fluorinated Metal Hydrides for the Catalytic Hydrolysis of Metal-Hydrogen Complexes", KIM, Seoul, Korea, Oct. 27-28, 2000, Proceedings of the 10th Annual Meeting of Korean Institute of Metals & Materials [PR+PU]

•**Project 13: Ca-Based Ternary Alloys** [Leader: N. Kuriyama (Japan)]

K. Kadir, N. Kuriyama, H. Tanaka, A. Imasato, H. T. Takeshita, T. Sakai and I. Uehara: "Synthesis and characterization of a new series of hydrogen storage alloys, in the AB₂C₉ system isostructural with LaMg₂Ni₉", International Symposium on Metal-Hydrogen Systems, Fundamentals and Applications, Hangzhou, China, Oct. 4-9, 1998 [PR]

K. Kadir, T. Sakai and I. Uehara: "Structural investigation and hydrogen capacity of YMg₂Ni₉ and (Y_{0.5}Ca_{0.5})(MgCa)Ni₉: new phases in the AB₂C₉ system isostructural with LaMg₂Ni₉", J. Alloys and Compounds, **287** (1999), 264 [PU]

K. Kadir, N. Kuriyama, T. Sakai, I. Uehara, L. Eriksson: "Structural investigation and hydrogen capacity of CaMg₂Ni₉: a new phase in the AB₂C₉ system isostructural with LaMg₂Ni₉", J. Alloys and Compounds, **284** (1999), 145 [PU]

K. Kadir, I. Uehara, T. Sakai and H. Tanaka: "Ternary hydrogen storage alloys and process for production thereof", EU Patent No. 99119299.8 (Dec. 1999) [PU]

K. Kadir, T. Sakai and I. Uehara: "Structural investigation and hydrogen storage capacity of LaMg₂Ni₉ and (La_{0.65}Ca_{0.35})(Mg_{1.32}Ca_{0.68})Ni₉ of the AB₂C₉ system type structure", J. Alloys and Compounds, **302** (2000), 112 [PU]

H. Tanaka, H. T. Takeshita, T. Kiyobayashi, N. Kuriyama, M. Haruta and D. Noréus: "Research on New Ca-based hydrogen storage alloys", 7th meeting of Energy Research-Promoting Organization, Tsukuba, Japan, Feb. 23, 2000 [PR]

H. Tanaka, Y. Sakamoto, H. T. Takeshita, N. Takeichi, T. Kiyobayashi, and N. Kuriyama, "Survey of ternary intermetallic compound phases in Ca-TM-Al alloy system and hydriding behaviors thereof", MH2000, Noosa, Australia, Oct. 1-6, 2000 [PR]

•**Project 14: Catalytically-Enhanced Sodium Aluminum Hydride** [Leader: C. Jensen (USA)]

R. Zidan: "Catalytically enhanced aluminum hydrides: practical hydrogen storage materials", Oral Presentation, Gordon Research Conference on Hydrogen Metal Systems, July 22, 1999 [PR]

K.J. Gross, S. Guthrie, S. Takara and G. Thomas: "In Situ X-ray Diffraction Study of the Decomposition of NaAlH₄", Poster Presentation, Gordon Research Conference on Hydrogen Metal Systems, July 21, 1999 [PR]

G. Thomas, S. Guthrie, and K. Gross: "HYDRIDE DEVELOPMENT FOR HYDROGEN STORAGE", PROCEEDINGS OF THE 1999 DOE/NREL HYDROGEN PROGRAM REVIEW, MAY 4-6, 1999, Rept. NREL/CP-570-26938, pp. 452-461 [PR+PU]

C.M. Jensen, S. Takara and R.A. Zidan: "HYDROGEN STORAGE VIA CATALYTICALLY ENHANCED METAL HYDRIDES", PROCEEDINGS OF THE 1999 DOE/NREL HYDROGEN PROGRAM REVIEW, MAY 4-6, 1999, Rept. NREL/CP-570-26938, pp. 472-477 [PR+PU]

C.M. Jensen and S. Takara: "Catalytically Enhanced Systems for Hydrogen Storage", Proceedings of the 2000 U.S. DOE Hydrogen Program Review, May 9-11, 2000, San Ramon, CA, Report NREL/CP-570-28890 (URL: <http://www.eren.doe.gov/hydrogen/docs/28890toc.html>) [PR+PU]

K.J. Gross, G.J. Thomas and G. Sandrock: "Hydride Development for Hydrogen Storage", Proceedings of the 2000 U.S. DOE Hydrogen Program Review, May 9-11, 2000, San Ramon, CA, Report NREL/CP-570-28890 (URL: <http://www.eren.doe.gov/hydrogen/docs/28890toc.html>) [PR+PU]

K.J. Gross, S. Guthrie, S. Takara and G. Thomas: "In-situ X-ray diffraction study of the decomposition of NaAlH₄", J. Alloys and Compounds, **297** (2000) 270-281 [PU]

D. Chartouni and K. J. Gross: "Phase transition in LaNi₄Co during electrochemical cycling, an in situ X-ray diffraction study", Journal of the Electrochemical Society, in press [PU]

K.J. Gross, G. Sandrock and G. Thomas: "Real Time X-ray Diffraction of Catalyzed Alanates", MH2000, Noosa, Australia, Oct. 1-6, 2000, J. Alloys and Compounds, in press [PR+PU]

G. Sandrock, K. Gross, G. Thomas, C. Jensen, D. Meeker and S. Takara: "Engineering considerations in the use of catalyzed sodium alanates for hydrogen storage", MH2000, Noosa, Australia, Oct. 1-6, 2000, J. Alloys and Compounds, in press [PR+PU]

K.J. Gross, C. Jensen, S. Takara and G.J. Thomas: "Catalyzed alanates for hydrogen storage", MH2000, Noosa, Australia, Oct. 1-6, 2000, J. Alloys and Compounds, in press [PR+PU]

B. Lewandowski, T. Seidel, S. Takara, D-I. Sun and C.M. Jensen: "Dissociation/Reassociation Kinetics of Catalytically Enhanced NaAlH₄", MH2000, Noosa, Australia, Oct. 1-6, 2000 [PR]

G.J. Thomas, K.J. Gross and N.Y.C. Yang: "Microstructural Characterization of Catalyzed NaAlH₄", MH2000, Noosa, Australia, Oct. 1-6, 2000, J. Alloys and Compounds, in press [PR+PU]

C.M. Jensen and Karl J. Gross: "Review. Development of catalytically enhanced sodium aluminum hydride as a hydrogen storage material", Applied Physics A (to be published, Feb. 2001 special issue) [PU]

• **Project 15: Metal Hydride Safety Testing** [Leader: Lynch (USA)]

No presentations or publications reported.

• **Project 16: Synthesis and Crystal Structural Analysis of New Ternary Hydrides Based on Hydride-Fluoride Similarity** [Leader: Akiba (Japan)]

F. Gingl and A. Akiba: "The Hydride Fluoride Crystal Structure Database, HFD - An Update", Poster Presentation, Gordon Research Conference on Hydrogen Metal Systems, July 19, 1999 [PR] (Proj. 7 & 16)

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