

Curriculum vitae

Tessui Nakagawa

PERSONAL DETAILS

Full Name : Tessui Nakagawa
Date of Birth : 19 September, 1981
Nationality : Japanese
Affiliation : Assistant Professor in Faculty of Science, University of the Ryukyus.
Address : 262-6 Senbaru, Nishihara, Nakagami-gun, Okinawa
Phone : 098-895-8535
FAX : 098-895-8565
E-mail : tessui@sci.u-ryukyu.ac.jp

RESEARCH INTERESTS

- Hydrogen storage materials based on light elements such as B, N, Li, etc. especially ammonia borane related materials
- Development of hydrogen storage alloys having CO₂ poisoning tolerance
- Chemical synthesis by high pressure milling techniques and solution methods
- Methanation catalyst using hydrogen storage alloys
- Recycle science

EDUCATION

2009-2006 **Doctoral Degree (Ph.D: Chemical Physics and Material Science)**
Hiroshima University, Japan
Graduate School of Advanced Science of Matter,
Department of Quantum Matter
Supervisor: Prof. Yoshitsugu Kojima
Worked on the project: Studies of hydrogen storage properties on the Metal-B-H systems

2006-2004 **Masters Degree (M.S.: Chemical Physics and Material Science)**
Hiroshima University, Japan

Graduate School of Advanced Science of Matter,
Department of Quantum Matter

Supervisor: Prof. Hironobu Fujii

Worked on the project: Studies of hydrogen storage properties on the
Metal-N-H systems (2005-2004) and Metal-B-H systems (2005)

2004-2000 **Bachelors Degree (Physics: Condensed Matter)**

Hiroshima University, Japan

Faculty of Science,

Department of Physical Sciences

Supervisor: Prof. Toshiro Takabatake (research field: magnetic matter)

Worked on the project: Magnetic, Thermal, Transport and Structural
Studies on YbGaGe

RESEARCH AND PROFESSIONAL EXPERIENCE

➤ Assistant Professor (Present-2012):

Chemistry course, Department of Biology, and Marine Science, Faculty of
Science, University of the Ryukyus, Okinawa, Japan

➤ Postdoctoral Position (2012-2012):

Graduate School of Systems and Information Engineering, University of
Tsukuba, Ibaraki, Japan

➤ Postdoctoral Position (2012-2009):

Materials Physics and Applications Division, Material Chemistry Group
(MPA-MC) at Los Alamos National Laboratory, Los Alamos, NM, USA

➤ Postdoctoral Position (2009-2009):

Institute for Advanced Material Research, Hiroshima University,
Hiroshima, Japan

SKILLS

Laboratory Skills

- Synthesis of organic/inorganic materials (metal amidoborane, MOFs, amides, borohydrides, magnetic material, etc.) without exposure to air and in controlled temperatures, atmospheres, etc. (milling, solution, hydrothermal method)

- Rotary evaporator
- Karl Fisher titration (water concentration) analysis
- Conversion method of NH_3BH_3 from BNH_x ($x = 2\sim 0.5$) using hydrazine in liquid ammonia
- Nuclear Magnetic Resonance (NMR; solid, liquid)
- X-ray Absorption Spectroscopy (XAS)
- Raman Scattering
- Infrared (IR) without exposing air
- Gas chromatography (GC)
- Scanning Electron Microscope combined with Energy Dispersive X-ray analysis (SEM-EDS)
- In-situ observation of reaction in controlled temperatures and atmospheres using Optical Microscope
- X-ray Diffraction (XRD; powder and single crystal)
- Differential Scanning Calorimetry (DSC)
- Thermal Decomposition Mass Spectroscopy (MS)
- Thermogravimetry and Differential Thermal Analysis (TG)
- Evaluation method of desorbed and absorbed gas amount using Sievert's-type Apparatus (PCT)
- Evaluation method of desorbed gas amount using burette system
- Ball Milling Equipments (Rotating and Vibrating Types of the Mechanical, without exposing air)
- Glove box (setup and maintenance)
- Cultivation of single crystal (metal alloys, hydrogen storage materials, MOFs)
- Machine tools (lathe, drill press, jig saw, etc.)
- Construction of gas control systems (introducing different gases and evacuation)
- Reactor for the liquid hydrogen storage materials (construction and operation)

Computer Skills

- OS: Windows, Macintosh, LINUX
- Software: Origin, Mathematica, Endnote, Adobe Photoshop, Adobe Premiere Elements, Rigaku REX2000 (for XAS analysis), Microsoft Office (Word, Excel, Power Point and Access), and JADE (for XRD analysis)
- Computer programming (LabView, HTML, C, etc.)
- Rietveld analysis
- Photo and movie editing

Other skills

- Conversion of a gasoline car to an electric car

LICENCES

- High school teaching (Science, given by MEXT Japan)
- Typing, creating, and editing document of PC (1st Grade, given by Japan jouhou gakushu sinkoukai)
- Personal computer instructor (2nd Grade, given by Japan jouhou gakushu sinkoukai)
- Kendo (2 dan, given by Japan Kendo kyokai)
- Shodo (5 dan, given by Japan Sessin kai)

TEACHING EXPERIENCE

Present-2012	University of the Ryukyus <ul style="list-style-type: none"> - Chemistry lab class - Inorganic Chemistry lab class - Freshman seminar - Computer training class - Practical skills in Presentation, Publication, and Patent Application
2005-2007	Private tutoring school teacher at Meirin gakuen in Higashi-Hiroshima, Japan (Middle school, Math and Science)
2005-2006	Teaching Assistant for the Experimental Lecture on Creation Science at Hiroshima University
2004-2005	Teaching Assistant for the Experimental Lecture on Physics at Hiroshima University
2004	Teaching Assistant for the Practical lecture on Physical Mathematics at Hiroshima University

ACTIVITIES

- Shodo: Management, display, and performance at art events as a calligrapher in Japan. Shodo instructor, providing art for books, T-shirts, name boards, etc. in the US.
- Table Tennis: Top 16 in national competition among Japanese national/public college/universities (2001,2002), Top ranked player in New Mexico State (2009-20011, among active players), Member of Ryukyu Asteeda (Club team)
- A member of “DeLorean EV conversion project”: The EV conversion and development, upgrading EV for hydrogen energy using hydrogen engine

(Hydrogen)

- Volunteer: Supporting activities for earthquake recovery on northern part of Japan (fund raising at “New Mexico Supporting Japan” and “Santa Fe Japan Aid”, donation, and personal volunteer activities)

EXPERIENCES As A BOARD MEMBER AND ORGANIZER

- [1] Editor of Materia Japan, The Japan Institute of Metals and Materials (2019-2017)
- [2] Secretary of The 25th International SPACC Symposium (2018)
- [3] Organizing committee of The committee on Next Generation Hydrides Research, The Japan Institute of Metals and Materials (2017)
- [4] Organizer of Hydrogen Meeting for Young Researchers (2014)
- [5] Organizer of International meeting on Advanced Material Science for Hydrogen (2014)
- [6] Secretary of The 63th Conference of Japan Society of Coordination Chemistry (2013)
- [7] Representative of Hiroshima University for the 11th Chugoku-Shikoku Venture Business Laboratory Summer School (2007)
- [8] Head of second workshop for the Japanese young researcher's meeting for hydrogen (2007)
- [9] Founder and board member of Japanese young researcher's meeting for hydrogen (2006)
- [10] Board member (contact officer) of 10th Chugoku-Shikoku Venture Business Laboratory Summer School (2006)
- [11] Representative of Chugoku area in National/Public College/Universities Table Tennis Association (2002-2003)

AWARDS

- [1] Special award of Okinawa Tech Grand Prix (University of the Ryukyus, Okinawa, Japan) 8, November, 2018
- [2] Poster Presentation Award, Hydrogen Meeting for Young Researchers (2014)
- [3] Professor of the year in University of the Ryukyus (2013)
- [4] Poster Presentation Award, Hydrogen Meeting for Young Researchers (2013)
- [5] Prize winner of 2010 Techno-Ai Idea Competition (Venture Business Laboratory, Kyoto University, Japan), 23 November, **2011**
- [6] Poster Presentation Award, Symposium of the MH Utilization Development

Society (Osaka, Japan), 5 February, **2006**

[7] Japan Institute of Metals Best Poster Award, 138th Spring Meeting of the Japan Institute of Materials (Tokyo, Japan), 21-23 March, **2006**

[8] Editor's Choice, Journal of the Physical Society of Japan (Publication [8]), **2004**

PUBLICATIONS

<Books>

[1] Development of Hydrogen Storage Materials and Its applications, 9-1, (2016)
ISBN 978-4-7813-1150-0

[2] Frontier of Production of Bio-Hydrogen and Development of Carriers of Hydrogen, 3-5, (2015) ISBN 978-4-7813-1063-3.

<Journal>

[1] "Electronic structure of octagonal boron nitride nanotubes", Lauren Takahashi, **Tessui Nakagawa**, and Keisuke Takahashi, *Int. J. Quantum Chem.* **118** (2017) e25542.

[2] "Synthesis, structural characterization and hydrogen desorption properties of Na[Al(NH₂BH₃)₄]", Yuki Nakagawa, Keita Shinzato, **Tessui Nakagawa**, Keita Nakajima, Shigehito Isobe, Kiyotaka Goshome, Hiroki Miyaoka, and Takayuki Ichikawa, *Int. J. Hydrogen Energy* **42** (2017) 6173-6180.

[3] "Effect of CO₂ on hydrogen absorption in Ti-Zr-Mn-Cr based AB₂ type alloys", Nobuko Hanada, Hirotaka Asada, **Tessui Nakagawa**, Hiroki Higa, Masayoshi Ishida, Daichi Heshiki, Tomohiro Toki, Itoko Saita, Kohta Asano, Yumiko Nakamura, Akitoshi Fujisawa, and Shinichi Miura, *J. Alloys. Compd.* **705** (2017) 507-516.

[4] "Dependence of constituent elements of AB₅ type metal hydrides on hydrogenation degradation by CO₂ poisoning", Nobuko Hanada, **Tessui Nakagawa**, Hirotaka Asada, Masayoshi Ishida, Keisuke Takahashi, Shigehito Isobe, Itoko Saita, Kohta Asano, Yumiko Nakamura, Akitoshi Fujisawa, Shinichi Miura, *J. Alloys. Compd.* **647** (2015) 198-203.

[5] "Physical, structural, and dehydrogenation properties of ammonia borane in ionic liquids", **Tessui Nakagawa**, Anthony K. Burrell, Rico E. Del Sesto, Michael T. Janike, Adam L. Nekimken, Geraldine M. Purdy, Biswajit Paik, Rui-Qin Zhong, Troy A. Semelsberger, Benjamin L. Davis, *RSC Adv.* **4** (2014) 21681-21687.

[6] "Synthesis of calcium borohydride by milling hydrogenation of hydride and boride", **Tessui Nakagawa**, Takayuki Ichikawa, Hiroki Miyaoka, Masami Tsubota, Yoshitsugu Kojima, *J. Jpn. I. Met.* **77** (2013) 609-614

[7] "Microstructure and hydrogen desorption characteristics of hydrogenated

- ScH₂-MB_n (*M* = Mg and Ca) systems synthesized by mechanical milling”, **Tessui Nakagawa**, Takayuki Ichikawa, Keiji Shimoda, Masami Tsubota, Hiroki Miyaoka, Shigehito Isobe, Tetsuo Homma, Shinji Michimura, Fumitoshi Iga, Somei Ohnuki, and Yoshitsugu Kojima, *Int. J. Hydrogen Energy* **38** (2013) 6744-6749.
- [8] “A Comparative Study of Structural Changes in NH₃BH₃, LiNH₂BH₃, and KNH₂BH₃ During Dehydrogenation Process”, Keiji Shimoda, Koichi Doi, **Tessui Nakagawa**, Yu Zhang, Hiroki Miyaoka, Takayuki Ichikawa, Masataka Tansho, Tadashi Shimizu, Anthony K. Burrell, and Yoshitsugu Kojima, *J. Phys. Chem. C*, **116** (2012) 5957-5964.
- [9] “Improved hydrogen release from ammonia-borane with ZIF-8”, Rui-Qin Zhong, Ru-Qiang Zou, **Tessui Nakagawa**, Michael T. Janicke, Troy A. Semelsberger, Anthony K. Burrell, and Rico E. Del Sesto, *Inorg. Chem.* **116** (2012) 5957-5964.
- [10] “Regeneration of Ammonia Borane Spent Fuel by Direct Reaction with Hydrazine and Liquid Ammonia”, Andrew D. Sutton, Anthony K. Burrell, David A. Dixon, Edward B. Garner III, John C. Gordon, **Tessui Nakagawa**, Kevin C. Ott, J. Pierce Robinson, and Monica Vasiliu, *Science*, **331** (2011) 1426-1429.
- [11] “Potassium(I) amidotrihydroborate: Structure and Hydrogen Release”, Himashinie V.K. Diyabalanage, **Tessui Nakagawa**, Roshan P. Shrestha, Troy A. Semelsberger, Benjamin L. Davis, Brian L. Scott, Anthony K. Burrell, William I.F. David, Kate R. Ryan, Martin Owen Jones, and Peter P. Edwards, *J. Am. Chem. Soc.*, **132** (2010) 11836-11837.
- [12] “X-ray Absorption Spectroscopic Study on Valence State and Local Atomic Structure of Transition Metal Oxides Doped in MgH₂”, Nobuko Hanada, Takayuki Ichikawa*, Shigehito Isobe, **Tessui Nakagawa**, Kazuhiko Tokoyoda, Tetsuo Honma, Hironobu Fujii, and Yoshitsugu Kojima, *J. Phys. Chem. C*, **113**, 13450-13455 (2009).
- [13] “Gas emission properties of the MgH_x-Zn(BH₄)₂ systems”, **Tessui Nakagawa**, Takayuki Ichikawa*, Yoshitsugu Kojima, and Hironobu Fujii, *Materials Transactions*, **48**, 556-559 (2007).
- [14] “Thermal analysis on the Li-Mg-B-H systems”, **Tessui Nakagawa**, Takayuki Ichikawa*, Nobuko Hanada, Yoshitsugu Kojima, and Hironobu Fujii, *Journal of Alloys and Compounds*, **446-447**, 306-309 (2007).
- [15] “Observation of Hydrogen Absorption/Desorption Reaction Processes in Li-Mg-N-H System by in-situ X-Ray Diffractometry”, **Tessui Nakagawa**, Takayuki Ichikawa*, Ryo Ida, Haiyan Leng, Nobuhiko Takeichi, Tetsu Kiyobayashi,

- Hiroyuki Takeshita, and Hironobu Fujii, *Journal of Alloys and Compounds*, **430**, 217-221 (2007).
- [16] “Mechanism of Hydrogenation Reaction in Li-Mg-N-H System” Haiyan Leng, Takayuki Ichikawa*, Satoshi Hino, **Tessui Nakagawa**, and Hironobu Fujii *Journal of Physical Chemistry B* **109**, 10744- 10748 (2005).
- [17] “Divalent state in YbGaGe: magnetic, thermal, transport and structural studies” Yuji Muro, **Tessui Nakagawa**, Kazunori Umeo, Masakazu Itoh, Takashi Suzuki, and Toshiro Takabatake, *J. Phys. Soc. Jpn.* **73**(6), 1450-1452 (2004).

PRESENTATIONS

International meetings

- [1] 13th International Forum on Ecotechnology (Okinawa, Japan) 18-19 March, **2019**, **Oral Presentation:** “Ammonia recycle – capturing, purification, and conversion to hydrogen”.
- [2] 2019 Symposium for the Promotion of Applied Research Collaboration in Asia (Okinawa, Japan) 28-30 February, **2019**, **Oral presentation:** “Dehydrogenation and regeneration of ammonia borane as related material for portable fuel cell charger”.
- [3] The 25th International SPACC Symposium (Okinawa, Japan) 23-25 November, **2018**, **Oral Presentation:** “Direct synthesis of Ammonia borane from ammine complex”.
- [4] The 16th International Symposium on Metal-Hydrogen Systems (Guangzhou, China) 28 October, **2018**, **Oral Presentation:** “Dehydrogenation of ammonia borane with metal hydride and ionic liquid: high quality, speed, and capacity”.
- [5] Thermec 2018 (Paris, France) 8 July, **2018**, **Oral Presentation (invited):** “Multiple roles of ionic liquids in dehydrogenation of ammonia borane”.
- [6] ISFE 2017 (Hiroshima, Japan) 10 July, **2017**, **Poster Presentation:** “Synthesis Mechanism of Ammonia Borane by Milling Technique”.
- [7] The 15th Japan/Korea International Symposium on Resources Recycling and Materials Science (Osaka, Japan) 17 April, **2017**, **Oral Presentation:** “Ammonia capturing and purification using ammine complex waste”.
- [8] Environmental Scientists Network for Asia-Pacific Islands 2017 (Okinawa, Japan) 20 March, **2017**, **Oral Presentation:** “Dehydrogenation and Regeneration of Ammonia borane-based materials for Energy storage”.
- [9] 11th International symposium of hydrogen and energy (Hawaii, USA) 26 Feb,

2017, Oral Presentation: “Room temperature dehydrogenation of ammonia borane”.

- [10] The 15th International Symposium on Metal-Hydrogen Systems (Interlaken, Switzerland) 7-12 August, **2016, Oral Presentation:** “Surface-controlled conversion of ammonia borane from boron nitride”.
- [11] The 15th International Symposium on Metal-Hydrogen Systems (Interlaken, Switzerland) 7-12 August, **2016, Oral Presentation:** “Effect of CO₂ on hydrogen absorption in Ti-Zr-Mn-Cr based AB₂ type alloys”.
- [12] The 15th International Symposium on Metal-Hydrogen Systems (Interlaken, Switzerland) 7-12 August, **2016, Oral Presentation:** “Synthesis of metastable Na[Al(NH₂BH₃)₄] by solid and solution methods: Structural characterization and hydrogen desorption properties”.
- [13] PRICM9 (Kyoto, Japan) 1-5 August, **2016, Oral Presentation:** “Regeneration of Ammonia Borane from Boron Nitride”
- [14] Nanocluster Synthesis, Characterization and Applications (Okinawa, Japan) 16-19 May, **2016, Oral Presentation:** “nanostructured M-B-H hydrogen storage materials by milling hydrogenation”.
- [15] Nanocluster Synthesis, Characterization and Applications (Okinawa, Japan) 16-19 May, **2016, Poster Presentation:** “Chemical treatment of nanostructured B-H materials towards synthesis of ammonia borane”.
- [16] 10th International symposium of hydrogen and energy (Iwate, Japan) 21-26 February, **2016, Oral Presentation:** “Room temperature dehydrogenation of ammonia borane”.
- [17] SPARCA 2015 (Taipei, Taiwan) 8 Feb **2015, Oral Presentation (invited):** “Regeneration of ammonia borane from several spent fuels”.
- [18] 2015 EMN East (Beijing, China) 8 Feb **2015, Oral Presentation (invited):** “Dehydrogenation and regeneration of Ammonia borane in Ionic liquids”.
- [19] The International Meeting on Advanced Material Science for Hydrogen (Okinawa, Japan) 25-27 August, **2014, Oral Presentation:** “Basic and hydrogen storage properties on Ammonia borane in Ionic liquids”.
- [20] The International Meeting on Advanced Material Science for Hydrogen (Okinawa, Japan) 25-27 August, **2014, Oral Presentation:** “Raman scattering investigation on ammonia borane and amido-borane compounds”.
- [21] 2011 “Hydrogen-Metal Systems” Gordon research conference (Easton, MA, USA), 17-22 July, **2011, Poster Presentation:** “Hydrogen Storage Properties for AB-IL-MOF System”.

- [22] 2011 “Hydrogen-Metal Systems” Gordon research seminar (Easton, MA, USA), 16-17 July, **2011, Poster Presentation:** “Hydrogen Storage Properties for AB-IL-MOF System”.
- [23] 2010 PACIFICHEM (Honolulu, HI, USA), 15-20 December, **2010** “Impurity study on ammonia borane based materials”.
- [24] 2010 MRS Fall meeting (Boston, MA, USA), 29 November-3 December, **2010, Poster Presentation:** “Dehydrogenation and Regeneration of AB-BmimCl System”.
- [25] MH 2008 -International Symposium on Metal-Hydrogen Systems- (Reykjavik, Iceland), 24-28 June, **2008, Poster Presentation:** “Hydrogen storage properties on Sc-*M*-B-H (*M* = Mg, Ca) systems”.
- [26] 3rd Norway-Japan Workshop (Hiroshima, Japan), 21-23 January, **2008, Oral Presentation:** “Hydrogen Storage Properties of *M*-B-H Systems”.
- [27] The First Oxford-Kobe Energy Seminars -Hydrogen Storage, The International Grand Challenge- (Hyogo, Japan), 22-24 April, **2007, Poster Presentation:** “*In-situ* Optical Microscope Observation of the Hydrogen Storage Materials”.
- [28] 2nd JPN-IFE meeting (Hiroshima, Japan), 24-25 January, **2007, Oral Presentation:** “Gas emission property of Mg-Zn-B-H system”.
- [29] MH 2006 -International Symposium on Metal-Hydrogen Systems- (Maui, USA), 1-6 October, **2006, Poster Presentation:** “Thermal Analysis on the *M*-B-H Systems”.

PATENTS

- [1] Japanese Patent “Synthesis method of ammonia borane” Publication No. **JP, 2019-039892, A.**
- [2] Japanese Patent “Hydrogen Production technique” Publication No. **JP, 2017-087096, A.**
- [3] Japanese Patent “Fuel cell and hot-water supply systems” Publication No. **JP, 2011-094032, A**
- [4] Japanese Patent “Hydrogen storage material and its storage technique” Publication No. **JP, 2009- 066550, A.**
- [5] Japanese Patent “Method of Purifying Gaseous Hydrogen” Publication No. **JP, 2008-069057, A.**
- [6] Japanese Patent “Hydrogen Storage Material and Hydrogen Generation Method” Publication No. **JP, 2007-320815, A.**