

Curriculum Vitae An Tiny Maria Hardy



I am an inorganic synthetic and materials chemist, with a particular focus on solution-based synthesis of materials for high-tech applications, which for the past decade allowed me to build relevant expertise in electrochemical properties. I am leading the group of DESINe (Design and synthesis of inorganic (nano)materials, mainly for energy applications) since 2009, being full professor since 2022, together with prof. dr. Marlies K. Van Bael at UHasselt's Institute for Materials Research. At DESINe, 19 PhD students and 3 postdocs are supervised. In leading the research group, my primary objective is to cultivate a work environment that is both supportive and inspiring for all members. I attach great importance to maintaining high quality standards and strive to ensure that these are upheld in all aspects of our research.

My vision is to develop a comprehensive understanding of the fundamental principles that govern the synthesis and assembly of complex inorganic structures, in collaboration with my PhD students and postdocs. This knowledge will enable us to design and synthesize new materials with tailored properties that can be used in a wide range of applications, from energy conversion and storage to catalysis and electronics. Since the proof of the pudding is in the eating, I also heavily invest in building expertise to characterize the functional materials properties for example for batteries or electrolysis cells.

Short CV

Personal information:

An Tiny Maria Hardy, ° 1978, married, 2 children, Belgian

Education and research training

2004-2010	Postdoctoral researcher at UHasselt - Research Foundation Flanders (FWO)
2000-2004	PhD at UHasselt, aspirant Research Foundation Flanders (FWO)
1998-2000	Master in Science – Chemistry, Ghent University, Belgium (licentiaat chemie)
1996-1998	Bachelor in Science – Chemistry, Hasselt University, Belgium (kandidaat chemie)

Academic career

2022- now	Full professor (Gewoon hoogleraar) – Chemistry, UHasselt
2018-2022	Professor (Hoogleraar) – Chemistry, UHasselt
2015- now	Guest professor at imec, division imomec, Diepenbeek
2013-2018	Associate professor – Chemistry, UHasselt
2009-2013	Assistant professor – Chemistry, UHasselt
2005-2009	Lecturer at XIOS University College – Department of industrial engineering

Teaching activities

TEACHING AS THE COORDINATOR OF COURSES - ONGOING IN 2022-2023

1. Chemical thermodynamics, 1st bachelor chemistry
2. Chemical equilibria and kinetics, 1st bachelor chemistry
3. Inorganic and solid state chemistry, 2nd bachelor chemistry
4. Chemical technology, 2nd bachelor business engineering
5. Master Internship, 1st master of materiomics

TEACHING AS A MEMBER OF THE EDUCATION TEAM OF COURSES - ONGOING IN 2022-2023

1. Basic skills, 1st bachelor chemistry;
2. Kennismakingstraject, 3rd bachelor chemistry – introduction to chemical research
3. Multidisciplinary biomedical research project, 3rd bachelor biomedical science
4. Introduction to chemistry, 2nd bachelor physics
5. Experimental design, 1st master biomedical sciences
6. Properties of functional materials, 1st master of materiomics
7. Advanced materials for emerging technologies, 1st master of materiomics
8. Materials design and synthesis, 1st master of materiomics
9. Hands-on project, 1st master of materiomics
10. Sustainable materials and energy, 1st master of materiomics

SUPERVISOR OF STUDENT PROJECTS

1. Master internships in industry (1st master materiomics),
2. Bachelor theses in chemistry
3. Bachelor and master theses in biomedical sciences
4. Voluntary student-researchers (for excellent students)

EIT INNOENERGY:

e-learning module teaching and coordination of hands-on lab trainings and teach the teacher sessions

Supervision of pre- and postdoctoral researchers

SUPERVISOR OF POSTDOCTORAL RESEARCHERS

Dries De Sloovere
Bjorn Joos

PROMOTER OF PHD STUDENTS AT UHASSELT

Zoleikha Mirzaie, 2023-
Robbe Jacobs, 2021-
Nele Debusschere, 2021-
Naomi Billiet, 2021-
Sander Stulens, 2021-
Raheed Bolia, 2020-,
Jonas Mercken, 2019-,
Ulrique Vounckx, 2019-,
An-Sofie Kelchtermans, 2018-,
Satish Mylavarapu, 2017-,
Ahmed Shafique, 2018-2023,
Andreas Paulus, 2016-2020,
Bjorn Joos, 2015-2019,
Dries De Sloovere, 2014-2018,
Fulya Ulu, 2014-2018,
Wouter Marchal, 2013-2017,
Jonathan Van den Ham, 2012-2016,
Thomas Vranken, 2011-2015

COPROMOTER

of 12 finished and ongoing PhD's

Institutional responsibilities

- Director of the new Master of Materiomics (<https://www.uhasselt.be/nl/studeren/opleidingen/master-in-materiomics>) at UHasselt
- Representative of UHasselt – Science faculty in the Operational Steering Group (OPS) of Energyville
- Member of the education management team of the Bachelor in Chemistry at UHasselt
- Member of the education management team of the Business engineering (Handelsingenieur) at UHasselt
- Coordinator of internationalization activities:
 - o For Bachelor of chemistry
 - o For master of materiomics
 - o Member of the internationalization task force of the faculty of sciences
 - o Member of the Board for internationalization of UHasselt
- Member of the board of the Doctoral school for science and technology
 - o Presenter of info session on reviewing procedures in scientific research
- Member of the Commission for Scientific Integrity
- Member of the task force on Marketing of the faculty of sciences and of the master of Materiomics
- Member of the “Bureau on education” of the faculty of sciences
- Member of the Taskforce on Lab Safety at UHasselt

Membership of scientific organization, societies, networks

- Member of the FWO panel W&T3 for 7 years, ended recently in 2022.
- Panel member for various FWO awards

- Member of PhD juries at UGhent, UAntwerp, VUB, KULeuven (Belgium) as well as international (TUEindhoven, University of Trondheim, Universidad Carlos III de Madrid)
- Editorial board member of Scientific Reports (Nature publishers)
- MRS-EMRS chapter at UHasselt: supervisor
- Memberships of KVCV (Flemish chemistry society), ACS (American chemical society) and MRS (Materials Research Society)
- Representing UHasselt in Waterstofnet (Hydrogen network)

R&D services provided to third parties

- Contracts with industry in the framework of bilateral or subsidized research projects e.g. Kaneka, Umicore, Agfa, ...

Awards

- Belgian ceramic society award for PhD research

Career path

Collaboration and teamwork are key components of my research philosophy. Rather than prioritizing individual success and self-promotion, **I firmly believe in the power of pooling expertise to achieve greater outcomes.** By working together in a cohesive manner, I am confident that we will produce breakthrough results.

My unique contribution is to bridge the gap between fundamental and applied research on synthesis, by leveraging insights from basic science towards practical applications of inorganic materials. The first step is to gain a fundamental understanding of the chemical and physical processes that occur during the synthesis of inorganic materials from solutions. This includes investigating the mechanisms of nucleation, growth, and crystallography of inorganic (nano)particles, as well as the self-assembly of these particles into larger structures. Also, we develop strategies to control the size and shape by exploring the use of additives, surfactants, and templates. We investigate the role of solvent properties, reaction conditions, and precursor chemistry on the final structure and properties of inorganic materials.

This way I aim to contribute to the **development of sustainable and environmentally friendly technologies**, solving one of the most pressing challenges facing society today, the energy transition, through inorganic materials synthesis.

Five main publications and/or achievements

An Hardy's research focuses on chemical solution based synthesis of inorganic nanomaterials, focusing on the understanding of relations between synthesis, material properties and functional properties. An Hardy (H-index 25, WoS or 31 Google scholar) published over 140 **papers in international journals** in total, as (co-)author, with **over 40 publications in the last 5 years (2018-2022)**. More than 2000 citations have been reached (source: web of science). The work has been presented at various international conferences including around 40 invited talks in national and international conferences. An Hardy is co-inventor of 4 patents, 3 of which were applied for in the past 2 years. A full list of all publications is available from Web of Knowledge, or the UHasselt document server:

<https://documentserver.uhasselt.be/cris/rp/rp02004;jsessionid=BD1BAA480C96DEFD5DA1AE9197892645>

- J. Mercken, D. De Sloovere, B. Joos, L. Calvi, G. Mangione, L. Pitet, E. Derveaux, P. Adriaenssens, M.K. Van Bael, A. Hardy, Altering mechanical properties to improve electrode contacts by organic modification of silica based ionogel electrolytes for sodium-ion batteries, **Small**, 2023, 19, 2301862
- B. Joos, K. Elen, J. Van den Ham, N. Meulendijks, P. Buskens, A. Paulus, K. Wouters, J. Manca, J. D'Haen, S. Shukla, B. Vermang, M. Van Bael, A. Hardy, Facile aqueous solution-gel route toward thin film CuBi₂O₄ photocathodes for solar hydrogen production, **Advanced sustainable systems**, 2023, 7, 2300083
- K. R. Prakasha, J. Grins, A. Jaworski, T. Thersleff, G. Svensson, L. Olav Josang, A. Dalager Dyrli, A. Paulus, D. De Sloovere, J. D'Haen, M.K. Van Bael, A. Hardy, H. Avireddy, J. Ramon Morante, J. Jacas Biendicho, Temperature-driven chemical segregation in Co-free Li-rich-layered oxides and its influence on electrochemical performance, **Chemistry of materials**, 2022, 34, 8, 3637
- H. Hamed, S. Yari, J. D'Haen, F.U. Renner, N. Reddy, A. Hardy, M. Safari, Demystifying charge transport limitations in the porous electrodes of lithium-ion batteries, **Advanced energy materials**, 2020, 10, 47, 2002492
- B. Joos, J. Volders, R. Ribero da Cruz, E. Baeten, M. Safari, M.K. Van Bael, A. Hardy, Polymeric backbone eutectogels as a new generation of hybrid solid-state electrolytes, **Chemistry of materials**, 2020, 32, 9, 3783

Other scientific output and impact

I have experience communicating with diverse groups, including secondary school pupils, university students, the media (newspaper, radio, television), and the general public (see section on outreach activities). I have chaired the lecture series

called "Materialize the future" organized by the master of materiomics at UHasselt. Besides, I have co-organized several conferences and symposia, internationally. I am the presenting author and contributing author to more than 40 invited lectures on specialized materials' related conferences (see complete publication list). I have reviewed submitted papers for high impact journals such as Advanced materials, Advanced energy materials, Advanced science, ACS Energy Letters etc. I have reviewed project proposals for FWO and international universities.

List the representative and substantial fellowships, projects and any other kind of research grants you obtained within the five years preceding the submission date of this project application.

1. UHasselt Green hydrogen lab – Relance funding 1/12/2021-30/4/2024
2. Belgian Fundamental Hydrogen Expertise "Be-Hyfe" - Energy transition fund 01/10/2021 - 31/03/2026
3. Functionally graded electrodes for lithium-sulfur batteries with long life time - SIM-SBO project 01/09/2021 - 31/08/2025
4. SYN-CAT on photoelectrochemical CO₂ conversion - Catalisti Moonshot cSBO project 01/03/2021 - 28/02/2025
5. CleanH2 – Fundamental research of sunlight driven hydrogen generation using abundant catalysts and durable hybrid perovskites as light absorbers – UHasselt BOF Grand Challenges project 01/01/2021 - 31/12/2024
6. Cobra project Cobalt free batteries for automotive applications – H2020 LCBAT5 01/01/2020 – 30/6/2024
7. Solidify project: Liquid-Processed Solid-State Li-metal Battery: development of upscale materials, processes and Architecture – H2020 LCBAT 01/01/2020 – 31/12/2023
8. PlasMaCatDESIGN : Design of support materials and catalysts for selective and energy-efficient plasma driven conversions - FWO SBO project 01/01/2019 - 31/12/2022
9. Insight in the design, synthesis and properties of new Na ion conducting electrolytes – FWO research project 01/01/2019 - 31/12/2022
10. VITO PhD on Li-S batteries – Ahmed Shafique 01/08/2018 - 30/04/2022
11. Bilateral research collaboration on photoelectrochemical water splitting with TNO (The Netherlands) - 01/02/2021 - 31/12/2021
12. Dioxide to monoxide (D2M): innovative catalysis for CO₂-CO-conversion – Catalisti project 01/01/2020 - 30/09/2021
13. XL-Lion Advanced lithium ion batteries with dual ionic-electronic conducting core-shell particles – FWO SBO project 01/03/2017 - 28/02/2021
14. Insight in the design, synthesis and properties of novel Na ion conductive electrolytes: increasing the toughness of ionogels with organic modification – FWO SB PhD project Jonas Mercken - 01/10/2019 - 30/10/2023
15. Improved performance of cathodes with NaCl structure for lithium batteries using redox reactions of the oxygen sublattice to control the transition metal cations migration – FWO research project 01/01/2016 - 31/12/2019
16. Synthesis of onion structured core-multishell particles for improved lithium-sulfur batteries – FWO SB PhD project Ulrique Vounckx 1/11/2019 – 30/10/2023
17. Chemical synthesis of inorganic composite solid state electrolytes with improved ionic conductivity by Li⁺ ion diffusion at the interface - 01/10/2015 - 30/09/2019