Prof. Dr. Maksym Yarema

Gloriastrasse 35, ETZ H94
8092 Zürich
+41 76 334 2013
yaremam@ethz.ch

ORCID: 0000-0002-2006-2466
ResearcherID: A-2851-2015
Google Scholar ID: Maksym Yarema

Group homepage: www.cmd.ethz.ch

Education

05.2008 – 02.2012	**PhD in Chemical Engineering**, thesis on Nanoscience and Nanotechnology (honors) Dept. of Solid State Physics, Johannes Kepler University Linz, Austria Advisor: Prof. Dr. Wolfgang J. Heiss
08.2008 – 09.2008	**Visiting PhD student** in the group of Prof. Dr. Dmitri Talapin Dept. of Chemistry, University of Chicago, USA
09.2002 – 07.2007	**BSc and MSc in Chemistry**, thesis on Intermetallic Compounds (honors) Dept. of Chemistry, Ivan Franko National University of Lviv, Ukraine Advisor: Prof. Dr. Roman E. Gladyshevskii
01.2007 – 02.2007	**Visiting master student** in the group of Prof. Dr. Thomas Fässler Dept. of Chemistry, Technische Universität München, Germany
09.1991 – 05.2002	Chervonograd **Gymnasium**, Lviv region, Ukraine Major in mathematics and natural sciences (honors)

Professional experience

01.2020 – 12.2024	**non-tenure track Assistant Professor** (ERC funded) Chemistry and Materials Design Group, Institute for Electronics Dept. of Information Technology and Electrical Engineering, ETH Zurich, Switzerland
08.2016 – 12.2019	**Senior Scientist** (Oberassistent) and **SNSF Ambizione Fellow** Materials and Device Engineering Group, Institute for Electronics Dept. of Information Technology and Electrical Engineering, ETH Zurich, Switzerland
11.2013 – 07.2016	**Postdoctoral Researcher** Dept. of Information Technology and Electrical Engineering, ETH Zurich, Switzerland Advisor: Prof. Dr. Vanessa C. Wood
03.2012 – 10.2013	**Marie Curie Postdoctoral Fellow** Laboratory for Thin Films and Photovoltaics, EMPA, Dübendorf, Switzerland Advisor: Prof. Dr. Maksym V. Kovalenko
05.2008 – 02.2012	**Research Project Assistant** Dept. of Solid State Physics, Johannes Kepler University Linz, Austria Advisor: Prof. Dr. Wolfgang J. Heiss
04.2007 – 01.2008	**Junior Technology Engineer** Scientific division of Ferozit™ building mixtures, Lviv, Ukraine
06.2005 – 08.2005	**Intern** at Helios GmbH Production of household chemistry, Lviv, Ukraine

Awards

07.2022	Finalist of the **Falling Walls Science Breakthrough 2022** in Physical Sciences
04.2018	**Best Talk Award** at the 2018 MRS Spring Meeting, Symposium NM12, Phoenix, USA
07.2017	ACS Nano **Best Poster Award** at the NaNaX8: Nanoscience with Nanocrystals, Braga, Portugal
09.2014	QSIT **q-starter Award**, best business idea of the NCCR Quantum Science and Technology
01.2014	**Logo design winner**, Scientific Center for Optical and Electron Microscopy (ScopeM), ETH
09.2006 – 05.2007	DAAD **Leonhard Euler Scholarship**, exchange programme in TU Munich, Germany
05.2006	Undergraduate **Student Award**, top-3 student of Dept. Chemistry, University of Lviv, Ukraine
1999 – 2002	Winner of **Chemistry Olympiads** (regional & all-Ukrainian levels), silver medal in 2000 – 7th rank

Funding

The total amount of funding awarded to date is 2 399 000 EUR

01.2020 – 12.2024	**ERC Starting Grant**, European Research Council, 1 604 000 EUR, PI
02.2018 – 06.2020	ETH Innovedum **Teaching Grant**, Teaching Commission of the ETH Zurich, 60 000 CHF, PI
05.2017 – 04.2018	QSIT Knowledge and **Technology Transfer Grant**, National Centre of Competence in Research "QSIT – Quantum Science and Technology", 80 000 CHF, co-PI
08.2016 – 07.2019	**SNSF Ambizione Fellowship** (Schweizerische Nationalfonds zur Förderung der wissenschaftlichen Forschung), 455 000 CHF, PI
03.2012 – 02.2014	**Marie Curie EMPA Postdocs Grant** (European Commission, Cofund Programme), 200 000 CHF, project leader

Teaching experience

2024 – present	Guest lectures for 227-0671-00L **Nanodevices and Circuits for the Beyond-Moore**, master level, 3 ECTS
2024 – present	Development and coordination of **Master Programme in electrical engineering** (educational collaboration between KSE Ukraine and ETH Zurich), 90 ECTS
2022 – present	227-0621-00L **Emerging Memory Technologies**, master level, 3 ECTS
2020 – present	227-0669-00L **Chemistry of Devices and Technologies**, bachelor level, 4 ECTS
2016 – 2021	227-0085-23L **Phase Change Materials and Memories**, bachelor level, 1 ECTS
12.2019	Tutorial lecture **Tailor-Made Chalcogenide Colloids**: Tuning Size, Composition and Structure of Nanomaterials at the 2019 MRS Fall Meeting & Exhibit, US
05.2018	Tutorial lecture on **PCM Applications of Colloidal Nanomaterials**, PhonSi Workshop, Friedrich-Alexander Universität Erlangen-Nürnberg, Germany
11.2016	Workshop on **Crystal Structure Visualization**: Best Practices and Introduction to Diamond Crystal Impact Software, ETH, bachelor and master level
2015 – 2024	Guest lectures **Synthesis of Materials for Optoelectronic Applications**, **Thin Film Fabrication Approaches,** and **laboratory component** for 227-0662-00L "Organic and Nanostructured Optics and Electronics", ETH, master level
2013 – 2018	Guest lecture **Quasicrystals** for "Functional Inorganics", ETH, master level

Supervision experience

3 PhD students	Dhananjeya Kumaar (2020 – 2024), Florian M. Schenk (2021 – present), Simon Wintersteller (2021 – present)
12 master students	Chun-Wei Chang (2023), Hanglin He (2023), Tristan Sachsenweger (2023), Matthias Can (2022), Simon Wintersteller (2021), Ho-Yun Lee (2021), Jasper Clarysse (2018), Vladimir Ovuka (2018), Augustin Zaininger (2017), Annina Moser (2017), Alexandra Turrini (2015), Peter Benedek (2015)
18 research projects	Lara Perren (2024), Chun-Wei Chang (2022), Xuandong Kou (2022), Hyeon Ko (2022), Zili Zhang (2022), Darijan Boskovic and Nathan Pharizat (2021), Roy Bernini (2021), Anina Saiko (2021), Matthias Can (2021), Simon Wintersteller (2020), Aris Mukherjee (2020), Sunniva Flück and Jaye Plüss (2020), Jasper Clarysse (2017), Kaja Jentner and Laura Rutishauser (2017), Yunhua Xing (2016), Thomas Maurer (2016), Nils Wenzler (2014), Karla Lienau (2013)
7 PhD co-advisor	Joel Casella (Romanyuk Lab, EMPA, 2022 – present), Raphael Schwanninger (Leuthold Lab, ETHZ, 2024), Mahsa Parvizian (De Roo Lab, Uni Basel, 2023), Annina Moser (Wood Lab, ETHZ, 2023), Mariano Calcabrini (Ibáñez Lab, ISTA, 2023), Laia Castilla i Amorós (Buonsanti Lab, EPFL, 2022), Antonio Cabas Vidani (Tiwari Lab, EMPA, 2020)

Highlights

06.2024	**Master thesis** of Hanglin He is published at H. He et al., *Adv. Electron. Mater.* **2024**, 2400203
09.2023	**Silver Poster Award** for Florian Schenk at the E\PCOS 2023 – European Phase Change and Ovonic Symposium, Rome, Italy
06.2023	**Best Talk Award** for Florian Schenk at the 1st Symposium on Materials Chemistry, Swiss Chemical Society (SCS), Dübendorf, Switzerland

07.2021	**Master thesis** of Jasper Clarysse is a basis of J. Clarysse et al., *Sci. Adv.* **2021**, *7*, eabg1934
10.2017	**Master thesis** of Annina Moser is published at A. Moser et al., *J. Phys. Chem. C* **2017**, *121*, 24345
09.2017	**Semester project** of Yunhua Xing is a basis of M. Yarema, Y. Xing, et al., *Sci. Rep.* **2017**, *7*, 11718
02.2017	**Master thesis** of Peter Benedek is a basis of P. Benedek et al., *RSC Adv.* **2017**, *7*, 17763

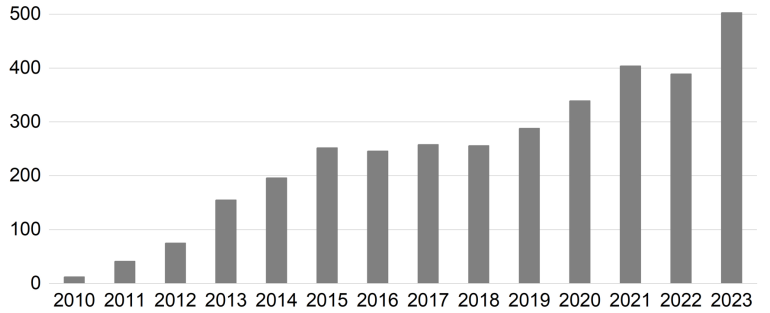
Academic commitments

08.2023	**Scientific Program Committee** member of IUPAC|CHAINS2023 conference, theme "Smart & Energy Materials"
2023 – 2024	**Advisory Board** member for Materials and Processes (MaP) Competence Center, ETH Zurich
2023 – 2024	**Selection Committee** member for the MSCA4Ukraine (European Commission initiative in frame of Marie Skłodowska-Curie Actions, 180 grants for displaced researchers from Ukraine)
2023 – present	**Editorial Advisory Board** in ACS Applied Nano Materials
2022 – present	**Associate Editor** for Frontiers in Chemistry, section Nanoscience
03.2021 – 03.2023	**Chair** of three annual nanoGe Spring Meetings, Symposium "Chemistry of Nanomaterials"
11.2019	**Chair** of nanoGe Fall Meeting 2019, Symposium "Charge Carrier Dynamics"
02.2018 – 05.2019	**Guest Editor** for Frontiers in Chemistry. Research Topic "Colloidal Semiconductor Nanocrystals"

Summary of publication list

81 peer-reviewed publications

- 73 original research articles
- 4 review articles
- 16 articles as a corresponding author



Selected publications

S. Wintersteller, O. Yarema, D. Kumaar, F. M. Schenk, O. Safonova, P. M. Abdala, V. Wood, and **M. Yarema**[*]. Unravelling the Amorphous Structure and Crystallization Mechanism of GeTe Phase Change Memory Materials. *Nature Commun.* **2024**, *15*, 1011.

F. M. Schenk, T. Zellweger, D. Kumaar, D. Bošković, S. Wintersteller, P. Solokha, S. De Negri, A. Emboras, V. Wood, and **M. Yarema**[*]. Phase-Change Memory from Molecular Tellurides. *ACS Nano* **2024**, *18*, 1, 1063-1072.

D. Kumaar, M. Can, K. Portner, H. Weigand, O. Yarema, S. Wintersteller, F. M. Schenk, D. Boskovic, N. Pharizat, R. Meinert, E. Gilshtein, Y. Romanyuk, A. Karvounis, R. Grange, A. Emboras, V. Wood, and **M. Yarema**[*]. Colloidal Ternary Telluride Quantum Dots for Tunable Phase Change Optics in the Visible and Near-Infrared. *ACS Nano* **2023**, *17*, 6985-6997.

J. Clarysse, A. Moser, O. Yarema, V. Wood, and **M. Yarema**[*]. Size- and Composition-Controlled Intermetallic Nanocrystals via Amalgamation Seeded Growth. *Sci. Adv.* **2021**, *7*, eabg1934.

O. Yarema, A. Perevedentsev, V. Ovuka, P. Baade, S. Volk, V. Wood, and **M. Yarema**[*]. Colloidal Phase-Change Materials: Synthesis of Monodisperse GeTe Nanoparticles and Quantification of Their Size-Dependent Crystallization. *Chem. Mater.* **2018**, *30*, 6134-6143.

M. Yarema[*], O. Yarema, W.M.M. Lin, S. Volk, N. Yazdani, D. Bozyigit, and V. Wood. Upscaling Colloidal Nanocrystal Hot-Injection Syntheses via Reactor Underpressure. *Chem. Mater.* **2017**, *29*, 796-803.

M. Yarema, M. Wörle, M.D. Rossell, R. Erni, R. Caputo, L. Protesescu, K.V. Kravchyk, D.N. Dirin, K. Lienau, F. von Rohr, A. Schilling, M. Nachtegaal, and M.V. Kovalenko. Monodisperse Colloidal Gallium Nanoparticles: Synthesis, Low Temperature Crystallization, Surface Plasmon Resonance and Li-Ion Storage. *J. Am. Chem. Soc.* **2014**, *136*, 12422-12430.

M. Yarema[*], S. Pichler, M. Sytnyk, R. Seyrkammer, R.T. Lechner, G. Fritz-Popovski, D. Jarzab, K. Szendrei, R. Resel, O. Korovyanko, M.A. Loi, O. Paris, G. Hesser, and W. Heiss. Infrared Emitting and Photoconducting Colloidal Silver Chalcogenide Nanocrystal Quantum Dots from a Silylamide-Promoted Synthesis. *ACS Nano* **2011**, *5*, 3758-3765.

M. Yarema[*], M.V. Kovalenko, G. Hesser, D.V. Talapin, and W. Heiss. Highly Monodisperse Bismuth Nanoparticles and Their Three-Dimensional Superlattices. *J. Am. Chem. Soc.* **2010**, *132*, 15158-15159.

Invited talks

2024 EPCOS, European Phase Change and Ovonic Symposium, Germany
2024 Lashkaryov readings, Institute of Semiconductor Physics, NAS, Ukraine
2024 Modern Trends in Teaching Chemistry, Ukraine
2023 Department of Material Science, Friedrich-Alexander Universität Erlangen-Nürnberg, Germany
2023 Physics Colloquium, Johannes Kepler University Linz, Austria
2023 Conference NaNaX10, Nanoscience with Nanocrystals, Austria
2023 Zernike Institute for Advanced Materials, University of Groningen, the Netherlands
2023 Institute of Science and Technology, Austria
2023 Innovation Day: World-saving technologies, ETH Zurich and the Embassy of Switzerland to Ukraine
2022 Institute of Chemical Sciences and Engineering, EPF Lausanne, Switzerland
2022 Spring Meeting of the European Materials Research Society (E-MRS), France (online)
2022 School of Chemical Engineering, University of New South Wales, Australia (online)
2021 Zernike Institute for Advanced Materials, University of Groningen, the Netherlands (online)
2021 Inaugural Lecture at ETH Zurich, Switzerland
2021 Swiss Academy of Natural Sciences (Platform Chemistry), Switzerland
2021 Conference FMIE-2021: Functional Materials for Innovative Energy, National Academy of Sciences, Ukraine
2020 ETH Industry Week 2020, ETH Zurich, Switzerland
2020 Dept. of Chemistry, University of Lviv, Ukraine
2020 Institute of Science and Technology, Austria
2019 Symposium EL04 of the 2019 MRS Fall Meeting & Exhibit, United States
2019 Dept. of Materials, ETH Zurich, Switzerland
2018 Dept. of Physics, RWTH Aachen University, Germany
2018 PhonSi Workshop, Friedrich-Alexander Universität Erlangen-Nürnberg, Germany
2017 Dept. of Physical Chemistry, Technische Universität Dresden, Germany
2014 Dept. of Physics, Montanuniversität Leoben, Austria
2012 Dept. of Chemistry, University of Lviv, Ukraine

Conference contributions

2024 ECIS, Conference of the European Colloid & Interface Society, Denmark (2 talks and poster)
2024 GRC Colloidal Semiconductor Nanocrystals, Switzerland (poster)
2023 IMC, International Conference on Crystal Chemistry of Intermetallic Compounds, Ukraine (talk, online)
2023 European Phase Change and Ovonic Symposium, Italy (talk)
2022 HYMA, International Conference on Multifunctional, Hybrid and Nanomaterials, Italy (talk)
2022 ISHHC19 International Symposium on Homogeneous and Heterogeneous Catalysis, Norway (talk, online)
2021 ACS National Fall Meeting, United States (talk, online)
2021 iNCNC, Online Internet NanoGe Conference on Nanocrystals (talk, online)
2019 MRS Fall Meeting, United States (talk)
2018 MRS Spring Meeting, United States (3 talks, best talk award)
2018 European Phase Change and Ovonic Symposium, Italy (poster)
2017 Swiss Chemical Society Fall Meeting, Switzerland (poster)
2017 Austrian Chemistry Days, Annual Meeting of GÖCH, Austrian Chemical Society, Austria (talk)
2017 NaNaX8, Nanoscience with Nanocrystals, Portugal (2 posters, best poster award)
2017 E-MRS, Spring Meeting of the European Materials Research Society, France (talk and poster)
2016 Swiss Chemical Society Fall Meeting, Switzerland (talk)
2015 MRS Spring Meeting, United States (talk)
2014 NaNaX6, Nanoscience with Nanocrystals, Austria (talk)
2013 63rd Lindau Nobel Laureate Meeting, Chemistry, Germany (attendee, competitive selection basis)
2012 CSX, Workshop on Simultaneous Combination of Spectroscopies with X-ray Techniques, Switzerland (poster)
2011 Gordon Research Conference on Clusters, Nanocrystals and Nanostructures, United States (poster)
2010 NaNaX4, Nanoscience with Nanocrystals, Germany (talk)
2010 QD2010, Quantum Dot conference, United Kingdom (talk)
2007 IMC, International Conference on Crystal Chemistry of Intermetallic Compounds, Ukraine (poster)

Languages

English (fluent C2), German (intermediate B2), Ukrainian (native)

Personal

Born October 27, 1985 in Ukraine, married, 2 children, hobbies: music and scientific data visualization