

# CURRICULUM VITAE (CV)

## 1. Personal information

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Name: **Janis Timosenko** (*Janis Timoshenko, Jānis Timošenko*)  
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## 2. Education

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### Higher education:

- 2010 – 2015 University of Latvia, Physics, Astronomy and Mechanics Doctoral Study Program (*Latvijas Universitāte, Fizikas, astronomijas un mehānikas doktora studiju programma*). Graduated on 04/03/2015.  
**Doctoral degree in condensed matter physics** (*Fizikas doktora zinātniskais grāds cietvielu fizikā*) earned.
- 2008 – 2010 University of Latvia, Physics Master Study Program (*Latvijas Universitāte, Fizikas maģistra studiju programma*). Graduated on 07/04/2010.  
Master degree in Physics (*Dabaszinātņu maģistra grāds fizikā*) earned.
- 2005 – 2008 University of Latvia, Physics Bachelor Study Program (*Latvijas Universitāte, Fizikas bakalaura studiju programma*). Graduated on 07/04/2008.  
Bachelor degree in Physics (*Dabaszinātņu bakalaura grāds fizikā*) earned.

### Languages:

- 1) Latvian – fluent in written and spoken
- 2) Russian – mother tongue
- 3) English – fluent in written and spoken
- 4) German – intermediate level of written and spoken language
- 5) Italian – beginner level

### Computer skills

- 1) Operating systems: *MS Windows (XP, Vista, 7, 8, 10), MS DOS, Linux*
- 2) Office applications: *MS Office, OpenOffice, Latex, Inkscape, Origin*
- 3) CAD software: *some experience with SolidWorks and TurboCad*
- 4) Molecular dynamics software: *GULP, also some experience with LAMMPS*
- 5) EXAFS data analysis software: *FEFF, Athena, FEFFIT, EDA*
- 6) Programming and scripting languages: *C/C++, Wolfram Mathematica, GNUplot, also some experience with Pascal, Python, Labview, Matlab, R, HTML*

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## 3. Employment history

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- 2018 – present Fritz-Haber Institute of Max Planck Society, Department of Interface science, group leader
- 2016 – 2018 Stony Brook University, Department of Materials Science and Chemical Engineering, postdoctoral scholar
- 2015 – 2016 Yeshiva University, Physics Department, postdoctoral scholar
- 2013 – 2015 University of Latvia, Institute of Solid State Physics, researcher
- 2012 – 2015 University of Latvia, Faculty of Physics and Mathematics, researcher
- 2009 – 2012 University of Latvia, Faculty of Computing, science assistant
- 2006 – 2009 University of Latvia, Faculty of Physics and Mathematics, programming engineer

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#### 4. Research expertise and interests

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**a) Areas of expertise:** material science, nanocatalysis, X-ray absorption spectroscopy, in-situ XAS studies, advanced XAS data analysis, machine learning methods, atomistic simulations techniques (molecular dynamics, reverse Monte Carlo methods), global optimization techniques (simulated annealing, evolutionary algorithms), linear algebra methods (principal component analysis, multivariate curve resolution/blind source separation method), theoretical physics (mesoscopic charge transport, quantum computing), some experience with computational fluid dynamics.

**b) Current research interests:** experimental investigations of materials with XAS method to link the structural and dynamical information from XAS with materials properties and function. I am particularly interested in the development and application of advanced data analysis approaches to fully benefit from the information, encoded in X-ray absorption spectra, and also in combination of experimental measurements with the results of theoretical modelling.

**c) Participation in experiments at synchrotron radiation facilities:**

I have participated in XAS experiments at DESY (Hamburg), ELETTRA (Trieste), SOLEIL (Paris), ALBA (Barcelona), SSRL (Stanford, CA), NSLS-II (Upton, NY), APS (Lemont, IL) synchrotron radiation facilities, including measurements in fluorescence and transmission modes, temperature-dependent, pressure-dependent XAS measurements, in-situ investigations of catalytic processes (SSRL, NSLS-II), RIXS measurements (APS), measurements in QXAFS mode (NSLS-II and DESY) and measurements with optically dispersed setup (SOLEIL). Also, I have some experience with FTIR measurements at SOLEIL synchrotron radiation facility.

**d) Participation in major research projects:**

U.S. National Science Foundation Project *Toolkit to Characterize and Design Bi-functional Nanoparticle Catalysts* under DMREF program (collaboration project, involving Yeshiva University/Stony Brook University, University of Texas in Austin, University of Pittsburgh), 2015 – 2018.

EUROFUSION projects *When and how ODS particles are formed? - X-ray Absorption Spectroscopy and ab initio modelling of ODS steels* and *ODS steel with high creep strength* (collaboration project of University of Latvia with Karlsruhe Institute of Technology (Germany) and CIEMAT (Spain)), 2014-2015.

EURATOM projects *Production and characterization of laboratory-scale batches of nano-structured ODSFD* and *Experimental validation of models* (collaboration project of University of Latvia with Karlsruhe Institute of Technology (Germany) and University of Helsinki (Finland), 2013 – 2015.

**e) participation in summer schools and workshops**

- 1) *Summer School on Atomistic Simulation Techniques* (04.07.2010. – 25.07.2010, Trieste, Italy);
- 2) *Ultrafast X-Ray Science with X-Ray Free-Electron Lasers* (29.03.2011. – 02.04.2011, DESY Hamburg, Germany);
- 3) *32nd Berlin School on neutron scattering* (07.03.2012. – 16.03.2012, HZB, Berlin, Germany).
- 4) *HERCULES-2013 (Higher European Research Course for Users of Large Experimental Systems)* (24.02.2013 - 28.03.2013, ESRF, Grenoble, France).
- 5) *HERCULES Specialized Course on Dynamical properties investigated by neutrons and synchrotron X-rays* (15.09.2014 - 19.09.2014, ESRF, Grenoble, France).

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#### 5. Teaching experience

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**a) Teaching positions**

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| 2021 – present | Teaching position in Statistical Physics/ Faculty for Physics and Mathematics, University of Latvia, Latvia |
| 2013 – 2015    | Teaching assistant – Quantum Theory / Faculty for Physics and Mathematics, University of Latvia, Latvia     |

## **b) Supervision of students and postdoctoral fellows**

- 2020 – *present* Direct supervision of 2 Postdocs (Dr. U. Hejral, Dr. A. Martini) and 1 PhD student (M. Rüscher). Co-supervision of 5 PhD students (C. Rettenmaier, A. Herzog, F.T. Haase, D. Kordus, M. Lopez-Luna) at the Interface Science Department at Fritz Haber Institute of Max Planck Society, Germany
- 2013 – 2015 Supervision of 1 undergraduate student (I. Jonane-Pudza) at the Institute of Solid State Physics at University of Latvia, Latvia

## **c) Other teaching activities**

- 2006 – *present* Co-organizer of Latvian Physics Olympiads for high school students, Latvia
- 2008 – 2014 Member of Council of Physics Study Program of Physics department, University of Latvia;

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## **6. Organization of scientific meetings**

- 2021 Co-organizer of European Nanoanalysis Symposium at European Materials Research Society Fall Meeting 2021
- 2016–2017 Co-organizer of “XAFS Short Course” workshops, Brookhaven National Lab, USA

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## **7. Awards and recognition**

- 2012 – Award of Latvian Academy of Sciences for a significant achievement in theoretical science (for the new approach for quantum algorithms design and new application of quantum interference in nanoelectronics, authors - A. Ambainis, V. Kashcheyevs, A. Belovs, **J. Timoshenko**).
- 2014 – Award of Latvian Academy of Sciences for a significant achievement in theoretical science (for the new method for investigations of structural and thermal disorder in crystalline and nanocrystalline materials using X-ray absorption spectroscopy and evolutionary algorithm approach, authors – **J. Timoshenko**, A. Anspoks, A. Kalinko, A. Kuzmin, J. Purans).
- 2015 – Award of Latvian Academy of Sciences for the young scientists (Ludvigs and Māris Jansons prize for the best work in physics).
- 2016 - Presidential Award of Latvian Academy of Sciences for the work on "Pressure-induced insulator to metal phase transition in tin tungstate", authors - A. Kuzmin, A. Anspoks, A. Kalinko, **J. Timoshenko** and R. Kalendarev.

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## **8. Membership of scientific societies**

- 2018 – present Member of International X-ray Absorption Society
- 2017 – present Member of American Chemical Society

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## **9. Most significant publications**

**Total number of publications (published or accepted for publication): 89, h-index: 26, ORCID 0000-0003-2963-3912**

- 1) **J. Timoshenko**, B. Roldan Cuenya, *In situ/operando electrocatalyst characterization by X-ray absorption spectroscopy*, Chem. Rev. 121, 882 (2021) (**review paper; journal impact factor (IF) 54.3**)

2) **J. Timoshenko**, H.S. Jeon , I. Sinev, F.T. Haase, A. Herzog, B. Roldan Cuenya *Linking the evolution of catalytic properties and structural changes in copper–zinc nanocatalysts using operando EXAFS and neural-networks*, Chem. Sci. 11, 3727 (2020) (**journal IF 9.3**)

3) **J. Timoshenko**, C.J. Wrasman, M. Luneau, T. Shirman, M. Cargnello, S.R. Bare, J. Aizenberg, C.M. Friend, A.I. Frenkel, *Probing atomic distributions in mono- and bimetallic nanoparticles by supervised machine learning*, Nano Lett. 19, 520 (2019) (**journal IF 11.2**)

4) **J. Timoshenko**, D. Lu, Y. Lin, A.I. Frenkel, *Supervised machine learning-based determination of three-dimensional structure of metallic nanoparticles*, J. Phys. Chem. Lett. 8, 5091 (2017) (**highlighted in the virtual issue of The Journal of Physical Chemistry on Machine Learning; journal IF 6.7**)

5) **J. Timoshenko**, A.I. Frenkel, *Probing structural relaxation in nanosized catalysts by combining EXAFS and Reverse Monte Carlo methods*, Catal. Today 280, 274 (2017) (**journal IF 5.8**)

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## 10. Patent applications

U.S. Patent application US20200003682A1 *System and method for structural characterization of materials by supervised machine learning-based analysis of their spectra* (under review, authors: A.I. Frenkel, **J. Timoshenko**).

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## 11. Most significant conference presentations

### Invited talks at major international conferences:

1) *Tracking the structure and composition of copper-based catalysts for CO<sub>2</sub> electroreduction using operando XAS*, ACS Spring Meeting 2021 (online)

2) *Probing disorder in nanoparticles using in-situ X-ray absorption spectroscopy and machine learning*, E-MRS Spring Meeting 2021 (online)

3) *In situ/operando electrocatalyst characterization by X-ray absorption spectroscopy*, Chemical Reviews Virtual Lecture Series (2021, online)

4) *Probing atomic-scale structure and dynamics in metallic nanocatalysts by x-ray absorption spectroscopy and theoretical simulations*, ACS 254<sup>th</sup> National Meeting, (2017, Washington, USA)

### Invited talks at workshops and summer schools:

1) *In situ/Operando X-ray Absorption Spectroscopy*, HZB Photon School (2019, 2020, 2021, 2022, Berlin & online)

2) *Basic and advanced analysis of extended X-ray absorption fine structure*, HZB Photon School (2021, on-line)

3) *Probing kinetics of catalyst transformations using synchrotron based operando techniques and machine learning*, invited plenary lecture at 6th International School-Conference on Catalysis for Young Scientists “Catalyst Design: From Molecular to Industrial Level” (2021, on-line)

4) *Machine learning algorithms for the analysis of spectroscopy data*, Correlative Materials Characterization, DGM European Advanced Training Course (2021, on-line)

5) *Reverse Monte Carlo modelling and neural networks in EXAFS analysis*, Advanced XAS Data Analysis and Modeling Virtual Workshop, Canadian Light Source, (2020, on-line)

6) *Extracting nanoscale details from X-ray absorption data by supervised machine learning*, NSLS-II and CFN Users' Meeting (Brookhaven National Lab, USA, 2018)