



## Curriculum Vitae

**Prof.dr. Daniel Vizman**

*Faculty of Physics*

*West University of Timișoara*

### Personal information

Name, Surname:	<b>Daniel Vizman</b>		
Date of birth:	09.04.1968	Sex:	M
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URL for personal website (if case):	- <a href="https://physics.uvt.ro/facultate/cadre-didactice/vizman-daniel/">https://physics.uvt.ro/facultate/cadre-didactice/vizman-daniel/</a>		

### Education

Year	Faculty/department - University/institution - Country
1998	PhD in physics - Faculty of Physics – West University of Timișoara – Romania
1992	Bachelor's in physics - Faculty of Physics – West University of Timișoara – Romania

### Positions - current and previous

Year	Job title – Employer - Country
2008-	Professor - West University of Timisoara (University), Faculty of Physics, Romania
2003-2008	Associate Professor - West University of Timisoara (University), Faculty of Physics, Romania
1998-2003	Lecturer - West University of Timisoara (University), Faculty of Physics, Romania
1995-1998	Teaching Assistant - West University of Timisoara (University), Faculty of Physics, Romania
1992-1995	Junior teaching Assistant - West University of Timisoara (University), Faculty of Physics, Romania

## Project management experience

Year	Project title - Role – Funder – Budget – link to project webpage
2005-2008	Transport phenomena and structure formation at the micro/nanometer scale in biomedicine and materials science (Nanosim), Director, CEEX –Research Excellence Program, nr.11/2005, Budget: 370.000 EURO Webpage: <a href="http://quasar.physics.uvt.ro/~vizman/nanosim/">http://quasar.physics.uvt.ro/~vizman/nanosim/</a>
2010-2013	Study of the influence of forced and natural convection on impurity segregation and coating stability in the ingot growth of multicrystalline Silicon for photovoltaic applications (CONSIL), Director, PN-II CAPACITIES, Partnership IFA-CEA France, nr.2/2012, Budget: 110.000 EURO Webpage: <a href="http://quasar.physics.uvt.ro/~vizman/CONSIL/">http://quasar.physics.uvt.ro/~vizman/CONSIL/</a>
2011-2014	Control of melt flow in a directional solidification configuration using an electromagnetic field, Director, PN-II IDEAS, PN-II-ID-PCE-2011-3-0789, 202.000 EURO Webpage: <a href="http://quasar.physics.uvt.ro/~vizman/idei_dv/">http://quasar.physics.uvt.ro/~vizman/idei_dv/</a>
2014-2016	High energy radiation effects on some fluoride and semiconducting crystals, Director, PN-II CAPACITIES/RO-CERN, nr. E13/2014, 155.000 EURO Webpage: <a href="http://quasar.physics.uvt.ro/~vizman/ELICRYS/">http://quasar.physics.uvt.ro/~vizman/ELICRYS/</a>
2016-2019	Physical and numerical experiments for studying the laser accelerated particles and their interaction with crystalline materials, Director, PN-III CAPACITIES/ELI-RO, nr. 32/2016, 250.000 EUR Webpage: <a href="http://quasar.physics.uvt.ro/~vizman/ELICRYS2/">http://quasar.physics.uvt.ro/~vizman/ELICRYS2/</a>
2018-2021	Technological paradigms in the synthesis and characterization of structures with variable dimensionality, VARDIMTECH, Responsible of the WUT team, PNIII – PCCDI, nr. 75PCCDI/2018, Webpage: <a href="https://infim.ro/project/vardimtech/">https://infim.ro/project/vardimtech/</a>
2018-present	Director of the Physics Department and since 2023 also the operational manager during the building of the institute ICAM - “Advanced Environmental Research Institute”. ICAM is a new research institute at West University of Timisoara build from structural funds with an investment of more than 10.000.000 EUR. Webpage: <a href="http://www.icam.uvt.ro">www.icam.uvt.ro</a>

## Other relevant professional experiences

Year	Description - Role
2020-	Member of the Physics Commission of the National Scientific Research Council
2015-2019	Member of the Physics Commission of the National Council for the Recognition of Degrees, Diplomas and Certificates (CNATDCU)
2019-present	Vicepresident of the Physics Commission of the National Council for the Recognition of Degrees, Diplomas and Certificates (CNATDCU)
2013-2018	Secretary of the European Network of Crystal Growth, <a href="https://encg.info/former_committees.html">https://encg.info/former_committees.html</a>
2023-present	Elected member of the Executive Committee of the International Organization for Crystal Growth, <a href="https://www.iocg.org/about/officers.php">https://www.iocg.org/about/officers.php</a>
2024	Member of the commission for awarding the prize for Energy and advanced materials at the Romanian research gala 2024
2014,2016	Chairman of the TIM14, TIM15-16 Physics Conference, Timisoara, Romania
2015,2018	Member of the Scientific Committee at the 5 <sup>th</sup> , 6 <sup>th</sup> European Conference on Crystal Growth 2015(Italy),2018(Bulgaria)
2016,2023	Member of the Scientific Committee at the 18 <sup>th</sup> , 20 <sup>th</sup> International Conference on Crystal growth 2016(Japan), 2023(Italy)
2006,2009, 2012,2015	Member of the Scientific Committee at the 5 <sup>th</sup> , 6 <sup>th</sup> , 7 <sup>th</sup> , 8 <sup>th</sup> , 9 <sup>th</sup> International Workshop on Modeling in Crystal Growth, 2006 (Germany), 2009(USA), 2012(Taiwan), 2015(Belgium), 2018(USA)
2023	Organizer of the summer school " Energy communities in mountain villages " in the frame UNITA university alliance project
2024	Chairman of the of the 11 <sup>th</sup> International Workshop on Modeling in Crystal Growth, 2024, Timisoara, Romania
2012-2016, 2020-2024	Director of the Doctoral School of Physics, West University of Timisoara
2016-2020, 2024-present	Dean of the Physics Faculty, West University of Timisoara
2018-present	Director of the Research Center in Physics of Materials and Renewable Energies at West University of Timisoara (MATREG), <a href="https://physics.uvt.ro/cercetare/centre-de-cercetare/">https://physics.uvt.ro/cercetare/centre-de-cercetare/</a>
2018-present	Member of the board of directors for the DRIFMAT-cluster (Distributed Research Infrastructure for Future Materials, Applications and Technology), <a href="https://drifmat.ro/">https://drifmat.ro/</a>

### C.3 Narrative CV

Prof. dr. Daniel Vizman is professor of Physics at West University of Timisoara, Romania with over 30 years of experience in higher education and research. He graduated in 1992 from Faculty of Physics, West University of Timisoara, Romania and received in 1998 a PhD in physics from the same university.

Throughout his career he taught the following courses: Classical Mechanics, Statistical Physics, Thermodynamics, Computational Physics, Modeling Crystallization Processes, Transport Phenomena.

During his PhD studies he benefited from a DAAD (German Academic Exchange Service) fellowship (1995-1996) at the Institute for Material Science, University of Erlangen - Nuernberg, Germany. Between 1999-2000 he was with the Fraunhofer IISB Institute, Erlangen, Germany under a PostDoc scholarship of Alexander von Humboldt Foundation, Germany. During 2000 to 2010 he completed several stages at Fraunhofer Institute in Erlangen as a coordinator of STHAMAS 3D software development team. He held seminars in the field of crystallization process modeling for researchers from the research and development departments of world leaders in the industry of obtaining Si and GaAs crystals (from Germany, Korea, Japan, USA).

Since 2009 Daniel Vizman is a PhD adviser and until now 10 doctoral theses have been completed under his guidance, two of them in the international co-supervision. He supervised over 20 dissertation and bachelor's theses. He was also a mentor for 5 Postdocs (2 of them won projects in the national competition for PostDocs projects).

Prof. Daniel Vizman was strongly involved in the project team that built the ICAM- "Advanced Environmental Research Institute" at the West University of Timisoara. At first as director of the physics department, then from 2023 and as operational director. Today ICAM is a modern institute with state of the art equipments, where the crystal growth laboratory is at an international level, constituting a solid basis for achieving the objectives of this proposal.

#### Research activity:

The main research results of Prof.dr. Daniel Vizman in the last 20 years were in the field of optimization of crystallization processes by means of numerical modelling and experiments. A special focus was put on growth of silicon crystals (with both electronic and photovoltaic applications) and optical crystals (with laser and solid-state LED-based lighting applications).

During the collaboration with the Fraunhofer Institute IISB, Erlangen, Germany (mainly during a Humboldt fellowship), Prof. Dr. Daniel Vizman was the leader of the group that developed the STHAMAS3D software for modelling the crystal growth processes. The software has been used by the majority of the leaders in the silicon crystal growth industry in Germany, Korea, Japan and USA. Using this program there were obtained outstanding results in the field of modelling and optimization of crystal growth processes:

- 3D modelling and optimization of Vertical Gradient Freeze (VGF) process. Use of Rosseland approximation for the study of radiative heat transfer in semi-transparent crystals.[1]
- 3D modelling and optimization of Si-Czochralski process. For the first time the prediction of temperature fluctuation in the melt for various crystal and crucible rotation rates were validated to experimental results. [2]
- Prediction of the influence of different types of magnetic fields (vertical, horizontal and cusp) on the S-L interface shape and on melt flow in Czochralski, Bridgman and VGF crystal growth processes.[3]
- A complex model was developed for Electromagnetic Czochralski process and results were validated to experimental results on interface shape obtained at NEC, Japan. [4]

- Study of the influence of the melt flow on the interface shape in a silicon ingot casting process[5]

At West University of Timisoara, Prof.dr. Daniel Vizman has built up a research group in the field of growth and characterization of bulk crystal. One of the very productive directions of the last ten years has been the optimization of directional solidification method for multi-crystalline silicon by numerical modelling and model experiments. Using the simulation software (STHAMAS3D) developed by the group leader and principal investigator of this project Prof. Dr. Daniel Vizman at Fraunhofer Institute IISB, Erlangen, Germany, a new melt stirring method based on the superposition of a magnetic field and an electrical current was proposed (see [6]). In the frame of a PN II-Ideas grant “*Control of melt flow in a directional solidification configuration using an electromagnetic field*”, 2011-2014, a model experiment for the new stirring method using a GaInSn-alloy (that is liquid at room temperature) was developed and the numerical predictions were confirmed experimentally [7]. Using the Bridgman growth furnace, small diameter multicrystalline silicon crystals have been successfully obtained and different novel solutions for crucible coating and crystal encapsulation have been proposed [8]. Under the project leader supervision 5 PhD thesis on directional solidification process of multicrystalline silicon have been completed in the last 10 years. One important result was obtained in the study of the influence of growth parameters on melt flow and crystallization interface shape for unidirectional solidification of multicrystalline silicon [5] published together with PhD student Alexandra Popescu on the symmetry of convection structures from silicon melt in relation to the imposed temperature gradient and the growth rate of the crystal. These results explained the distribution of impurities in the silicon crystal and the shape of the crystallization interface, the parameters on which the quality of the crystal depends. Crystal Growth and Design journal selected these results for the coverage of the January 2012 issue.

A novel idea for homogenizing the melt and optimizing the shape of the solidification interface in directional solidification method of multicrystalline silicon for photovoltaic applications proposes a solution based on mechanical stirring. The result was published [9] together with PhD student S. Dumitrica and with a collaborator from CEA, France, it proposes solutions for homogenizing the melt and optimizing the shape of the solidification interface. In this line, in 2013 were published 3 more articles that propose innovative ideas for melt control based on the use of magnetic and electric fields [6,10,11]. In the recent years, the research group profesor Vizman lead was focused on growth and characterization of fluoride crystals(Ca,BaF<sub>2</sub>) with several applications as windows from UV and visible to infrared, as optic windows in fusion reactors, scintillators, laser materials[10, 12,13]. In [13] we report that apart from the green and red emissions, arising under excitation at 378 nm, a new UV emission band centered at 321 nm (corresponding to the  $^2P_{3/2} \rightarrow ^4I_{15/2}$  transition) was observed under excitation at 290 nm. This emission was not reported before.

Based on his expertise and results in the optimization of crystal growth processes using the magnetic fields, the project leader, Prof. Dr. Daniel Vizman, had been invited to write a book chapter “Flow Control by Magnetic Fields during Crystal Growth from Melt” in the 2015 edition of Handbook of Crystal Growth [9].

Prof.dr. Daniel Vizman has developed collaborations with representative European research institutes (Fraunhofer Institute IISB, Germany; Institutes for Solar Energies INES, France; SINTEF Institute, Norway, Institute for Crystal Growth IKZ, Berlin, Germany) which have been materialized both in joint projects participations and joint publications.

For the results obtained in studying the crystal growth processes, the Romanian Academy awarded the project leader, Prof. Dr. Daniel Vizman, with the Constantin Miculescu award in 2014. Between 2012-2018 Prof. Dr. Daniel Vizman was the secretary of the European Network of Crystal Growth and in 2023 was elected as member of the Executive Committee of the International Organization for Crystal Growth.

Daniel Vizman was also strongly involved in the teaching activities in crystal growth at international level. He was professor at several international schools: Int. Summer School on Crystal Growth and Photovoltaic Materials, Brasov, Romania, 2012, 1st European Summer School on Crystal Growth, Bologna, Italia, 2015, International Summer School on Crystal Growth and Advanced Materials for Energy Conversion, Bucuresti, Romania, 2017, Laser ignition summer school, Brasov, Romania, 2017, 2nd European Summer School on Crystal Growth, Varna, Bulgaria, 2018, 3rd European Summer School on Crystal Growth, Paris, France, 2022.

### Bibliography

- [1] Journal of Crystal Growth 212, 334-339, 2000; [2] Journal of Crystal Growth 233, 687-698, 2001; [3] Journal of Crystal Growth 230, 73-80, 2001; [4] Journal of Crystal Growth 303, 221-225, 2007; [5] Crystal Growth & Design 12, 320-325, 2012; [6] Journal of Crystal Growth 372, 1-8 (2013); [7] European Journal of Mechanics B/ Fluids 52, 147- 159 (2015); [8] Journal of Crystal Growth 401, 720-726 (2014); [9] Journal of Crystal Growth 360, 76-80, 2012; [10] Journal of Crystal Growth 381, 169-178, 2013; [11] Journal of Crystal Growth 367, 77-87, 2013; [12] Radiation Physics and Chemistry 168, 108565, 2020; [13] Radiation Physics and Chemistry 176, 109024, 2020;

### Track record

1.	Investigation of $\gamma$ -photon sources using near-critical density targets towards the optimization of the linear Breit-Wheeler process, Vladisavlevici, IM, Ribeyre, X, <b>Vizman, D</b> , d'Humieres, E, Plasma Physics and Controlled Fusion, Vol 66, Issue 3, DOI 10.1088/1361-6587/ad20f7, Article Number 035009, 2024
2.	Theoretical investigation of the interaction of ultra-high intensity laser pulses with near critical density plasmas Vladisavlevici, IM, <b>Vizman, D</b> and d'Humieres, E, Plasma Physics and Controlled Fusion, Vol 65, Issue 4, DOI 10.1088/1361-6587/acbe63, Article Number 045012, 2023
3.	Particularities of the thermal and oxygen concentration instabilities in a Czochralski process for solar silicon growth Popescu, A and <b>Vizman, D</b> , Journal of Crystal Growth, Vol 611, DOI 10.1016/j.jcrysgro.2023.127177, Article Number 127177, 2023
4.	Racu, AV, Ristic, Z, Ciric, A, Dordevic, V, Buse, G, Poienar, M, Gutmann, Ivashko, O, Stef, M, <b>Vizman, D</b> , Dramicanin, MD, Piasecki, M, Brik, MG, Analysis of site symmetries of Er <sup>3+</sup> doped CaF <sub>2</sub> and BaF <sub>2</sub> crystals by high resolution photoluminescence spectroscopy, OPTICAL MATERIALS, Volume 136 DOI 10.1016/j.optmat.2022.113337, Article Number 113337, 2023
5.	Iuliana Vladisavlevici, <b>Vizman Daniel</b> , Emmanuel d'Humieres, 2022, Laser Driven Electron Acceleration from Near-Critical Density Targets towards the Generation of High Energy gamma-Photons, PHOTONICS, Vol. 9, Issue 12, Article number: 953, 2022
6.	Racu Andrei, Stef Marius, Buse Gabriel, Nicoara Irina, <b>Vizman Daniel</b> , Luminescence Properties and Judd-Ofelt Analysis of Various ErF <sub>3</sub> Concentration-Doped BaF <sub>2</sub> Crystals, MATERIALS, Vol. 14, Issue 15, Article number: 4221, 2021
7.	Alexandra Popescu, Martin Bellmann, <b>Daniel Vizman</b> , Effect of crucible rotation on the temperature and oxygen distributions in Czochralski grown silicon for photovoltaic applications, Crystengcomm, 23/2, 308-316, 2021

8.	Marius Stef, Irina Nicoara, Andrei Racu, Gabriel Buse, <b><u>Daniel Vizman</u></b> , Spectroscopic properties of the gamma irradiated ErF3-DOPED BaF2 crystals, Radiation Physics and Chemistry 176, 109024, 2020
9.	Irina Nicoara, Marius Stef, <b><u>Daniel Vizman</u></b> , Influence of Pb2+ ions on the optical properties of gamma irradiated BaF2 crystals, Radiation Physics and Chemistry 168, 108565, 2020
9.	Dragos Tatomirescu, <b><u>Daniel Vizman</u></b> , Emmanuel d'Humieres - Influence of target curvature on the characteristics of particle beams generated by laser ion acceleration with microstructured enhanced targets at ultra high intensity, Plasma Physics and Controlled Fusion Vol. 61, Issue 11, 114004, 2019
10	Irina Nicoara, Marius Stef, <b><u>Daniel Vizman</u></b> - Influence of growth conditions on the optical spectra of gamma irradiated BaF2 and CaF2 crystals, Journal of Crystal Growth, 525, 125188, 2019
11	Marius Stef, Irina Nicoara, <b><u>Daniel Vizman</u></b> - Distribution of Yb3+ and Yb2+ Ions along YbF3-Doped BaF2 Crystals, Crystal Research and Technology 53, 1800186, 2018
12	Irina Nicoara, Marius Stef, <b><u>Daniel Vizman</u></b> , Constantin Daniel Negut - Gamma-rays induced color centers in Pb2+ doped CaF2 crystals, Radiation Physics and Chemistry 153, 70, 2018
13	Dragos Tatomirescu, <b><u>Daniel Vizman</u></b> , Emmanuel d'Humieres - Numerical modeling of laser-driven ion acceleration from near-critical gas targets, Plasma Physics and Controlled Fusion 60, 064002, 2018
14	Alexandra Popescu, <b><u>Daniel Vizman</u></b> - Numerical study of the influence of forced melt convection on the impurities transport in a silicon directional solidification process, Journal of Crystal Growth 474, 55-60, 2017
15	Alexandra Popescu, Stelian Arjoca, <b><u>Daniel Vizman</u></b> - Numerical Study of Electromagnetic Stirring in a Cylindrical Configuration for Directional Solidification of Multi-Crystalline Silicon, Romanian Journal of Physics 62, 608, 2017
16	Oana Marinica, Daniela Susan-Resiga, Florica Balanean, <b><u>Daniel Vizman</u></b> , Vlad Socoliuc, Ladislau Vekas - Nano-micro composite magnetic fluids: Magnetic and magnetorheological evaluation for rotating seal and vibration damper applications, Journal of Magnetism and Magnetic Materials 406, 134-143, 2016
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18	Liliana Lighezan, Adrian Neagu, Adriana Isvoran, <b><u>Daniel Vizman</u></b> - Comparison of the structure and function of the ROF2 protein and its human homolog FKBP52, European Biophysics Journal with Biophysics Letters 44, S59, 2015
19	Radu Andrei Negrila, Alexandra Popescu, <b><u>Daniel Vizman</u></b> - Numerical and experimental modeling of melt flow in a directional solidification configuration under the combined influence of electrical current and magnetic field, European Journal of Mechanics, B/Fluids 52, 147-159, 2015
20	Cristina Bartha, Carmen Plapcianu, Petru Palade, <b><u>Daniel Vizman</u></b> - Model-free Kinetic Analysis of Sr2FeMoO6 Recrystallization Process Used for Double-Perovskite Monocrystals Grown by Bridgman Method, AIP Conference Proceedings 1694, UNSP 040006, 2015
21	Radu Andrei Negrila, Alexandra Popescu, <b><u>Daniel Vizman</u></b> - GaInSn Melt Flow Structure Variation with Crucible Size in an Isothermal Electromagnetic Stirring Configuration, AIP Conference Proceedings 1694, UNSP 030003, 2015
22	Vasile Pupazan, Radu Negrila, Octavian Bunoiu, Irina Nicoara, <b><u>Daniel Vizman</u></b> - Effects of crucible coating on the quality of multicrystalline silicon grown by a Bridgman technique, Journal of Crystal Growth 401, 720-726, 2014
23	<b><u>Daniel Vizman</u></b> , Kaspars Dadzis, Jochen Friedrich - Numerical parameter studies of 3D melt flow and interface shape for directional solidification of silicon in a traveling magnetic field, Journal of Crystal Growth 381, 169-178, 2013
24	<b><u>Daniel Vizman</u></b> , Cosmin Tanasie - Novel method for melt flow control in unidirectional solidification of multi-crystalline silicon, Journal of Crystal Growth 372, 1-8, 2013
25	Kaspars Dadzis, <b><u>Daniel Vizman</u></b> , Jochen Friedrich - Unsteady coupled 3D calculations of melt flow, interface shape, and species transport for directional solidification of silicon in a traveling magnetic field, Journal of Crystal Growth 367, 77-87, 2013
26	Sebastian Dumitrica, <b><u>Daniel Vizman</u></b> , Jean-Paul Grandet, Alexandra Popescu - Numerical studies on a type of mechanical stirring in directional solidification method of multicrystalline silicon for photovoltaic applications, Journal of Crystal Growth 360, 76-80, 2012

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29	Alexandra Popescu, <b>Daniel Vizman</b> - Numerical study of the influence of melt convection on the crucible dissolution rate in a silicon directional solidification process, International Journal of Heat and Mass Transfer 54, 5540-5544, 2011
30	Cosmin Tanasie, <b>Daniel Vizman</b> , Jochen Friedrich - Numerical study of the influence of different types of magnetic fields on the interface shape in directional solidification of multi-crystalline silicon ingots, Journal of Crystal Growth 318, 293-297, 2011
31	Octavian Bunoiu, Marius Stef, <b>Alexandra Popescu</b> , Daniel Vizman - Interface Shape Studies in Bridgman Growth of Multicrystalline Silicon, AIP Conference Proceedings 1387, 2011
32	Adrian Neculae, Stelian Arjoca, <b>Daniel Vizman</b> - Numerical Study of Heat Transfer in Buildings for Different Environmental Conditions, AIP Conference Proceedings, 1387, 2011
33	Jakob Fainberg, <b>Daniel Vizman</b> , Jochen Friedrich, Georg Mueller - A new hybrid method for the global modeling of convection in CZ crystal growth configurations, Journal of Crystal Growth 303, 124-134, 2007
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36	Carmen Stelian, <b>Daniel Vizman</b> - Numerical modeling of frequency influence on the electromagnetic stirring of semiconductor melts, Crystal Research and Technology 41, 645-652, 2006
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39	Dana Petcu, <b>Daniel Vizman</b> , Marcin Paprzycki - Porting CFD codes towards grids: A case study, Parallel Processing and Applied Mathematics / Lecture Notes in Computer Science 3911, 817-824, 2006
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