Filipoiu Nicolae

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link m/in/fil colae

Professional Summary

During my previous jobs I have gained experience in theoretical and computational materials science, specializing in Density Functional Theory (DFT) and multiscale modeling of functional materials. Proven expertise in the electronic, dielectric, and transport properties of advanced materials, with particular emphasis on hybrid perovskites for solar cells, high entropy alloys, ferroic materials and analysis of system with induced point defects due to extreme environments. I have experience in international research collaboration, high-performance computing, and parallel programming (MPI in `C` and `Python`), as well as in academic teaching and supervision.

Professional Experience

Postdoctoral Research Assistant, Romania *Mar 2025–Present*
Horia Hulubei National Institute for Research and Development in Physics and Nuclear Engineering (IFIN-HH)
Department of Computational Physics and Information Technology (DFCTI)

Part-Time Scientific Researcher, Romania *Apr 2025–Apr 2026*
National Institute of Materials Physics (NIMP)

This is a one-year part-time position focused on theoretical and computational investigations of novel materials with applications in solar cells and memristive devices.

Hourly-Paid Research Assistant, Romania *2024*
Faculty of Physics — University of Bucharest

I held laboratory sessions (4 hours per week) with practical exercises on Message Passing Interface (MPI), a portable message-passing standard designed for parallel computing architectures. The laboratory covered programming in `C` and `Python` and was delivered to two student groups from the Faculty of Mathematics.

Part-Time Research Assistant, Romania *Feb 2021–May 2022*
National Institute for Research and Development in Microtechnologies (IMT)

Team member in the project *Computational Design and Engineering of Functional Ferroic Interfaces (COMPFER)* (PN-III-P4-ID-PCE2020-1985). My role in the project involved DFT calculations of the electronic structure, electrical conductivity, and dielectric properties of the interfaces.

Research Assistant, Romania *Nov 2019–Mar 2025*
Horia Hulubei National Institute for Research and Development in Physics and Nuclear Engineering (IFIN-HH)

Department of Computational Physics and Information Technology (DFCTI)

My role focused on theoretical and computational investigations of novel materials using Density Functional Theory (DFT) calculations.

Education

PhD in Physics, Doctoral School of Physics — University of Bucharest *2021–2024*
Study Program: Condensed Matter Physics (English Program)

I defended my PhD thesis on November 1, 2024, titled *"Modeling Hybrid Perovskite Materials and the Dynamic Behaviour of Perovskite Solar Cells"*, under the supervision of Prof. George Alexandru Nemnes, and was awarded the PhD diploma with an *Excellent* qualification.

Master's Degree in Physics, Faculty of Physics — University of Bucharest *2019–2021*
Study Program: Physics of Advanced Materials and Nanostructures (English Program)

My Master's thesis, titled *"First-principles calculations of electronic properties in mixed-halide perovskite materials and devices"*, was supervised by Prof. George Alexandru Nemnes.

Bachelor's Degree in Physics, Faculty of Physics — University of Bucharest *2015–2019*
Study Program: Applied Engineering Sciences in Technological Physics

My Bachelor's thesis, titled *"Prepararea si caracterizarea nanotuburilor de nichel cu aplicatii in domeniul dispozitivelor magnetice"*, was supervised by Prof. Vlad Andrei Antohe.

Baccalaureate Diploma, "Vlaicu Vodă" National College *2010–2014*
Mathematics and Informatics

Academic Experience

Mobility Grant at Reykjavik University 2022
During the PhD program, I was awarded a mobility grant at Reykjavik University (Iceland) for a period of two months (October–November 2022). During this research stay, I collaborated with Prof. Andrei Manolescu and his research group on the theoretical investigation of new materials for perovskite solar cell applications. As a result of this collaboration, I contributed to the development of a new theoretical model for understanding the hysteresis phenomenon affecting the performance of perovskite solar cells. The model and results were published in: *"Capacitive and inductive effects in perovskite solar cells: The different roles of ionic current and ionic charge accumulation"*, *Physical Review Applied*, 18, 064087 (2022).

Student Travel Program in the USA 2017
During my Bachelor's studies, I participated in a Student Travel Program in the USA in the summer of 2017.

Project Member

Improved Optical Coatings for High Power Laser Systems (IMOC-HPLS) *2024–2027*
Project type: ELI-RO/OMP/2025
This project focuses on understanding degradation mechanisms of optical coating materials under extreme irradiation conditions and on optimizing these coatings for high laser-induced damage thresholds (LIDT). The study addresses both direct damage caused by high-power laser

irradiation and indirect effects originating from secondary radiation generated during experiments.
More details: https://www.ifa-mg.ro/eli/

(DRD3 – R&D on Semiconductor Detectors CERN) Radiation damage in Si and SiC based sensors (RADASS) *2024–2026*
Solid-state detectors (SSD), particularly silicon-based detectors, are extensively used in particle physics experiments due to their excellent spatial resolution enabled by advanced photolithographic segmentation techniques. They play a key role in primary and secondary vertex reconstruction, charged-particle tracking, and particle-flow calorimetry.

The final goal of the project is to achieve a fundamental scientific understanding of radiation damage processes in Si and SiC detector materials at low, high, and extreme radiation levels, as a necessary prerequisite for successful detector development.
More details: https://drd3.web.cern.ch/

Towards Perovskite Large Area Photovoltaics (PERLA-PV) *2020–2023*
Project ID: EEA-RO-NO-2018-0106
The project aimed at developing efficient, stable, and reproducible standard and inverted perovskite solar cells and photovoltaic modules. Emphasis was placed on scalable, cost-effective, and environmentally friendly fabrication technologies, while minimizing pollutant generation during the manufacturing process.
More details: https://perlapv.ro

Cloud and Big Data Center for Participation in the European Open Science Cloud (CECBID-EOSC) *2022–2023*
Project ID: Cod MySMIS 124405
The main objective of this project was to increase the research capacity and international scientific competitiveness of IFIN-HH by modernizing the Cloud infrastructure, expanding large-scale data storage and processing capabilities, and developing a high-performance data center integrated into the European Open Science Cloud (EOSC).
More details: https://cecbid-eosc.ifin.ro

Computational Design and Engineering of Functional Ferroic Interfaces (COMPFER)
2021–2022
Project ID: EEA-RO-NO-2018-0106
The main objective of this project was the computational design of high-performance functional magnetoelectric tunnel junctions (MFTJs) through interface engineering. The evaluation of model heterostructures was based on performance criteria including the stability and magnitude of ferroelectric polarization, magnetic moments, tunnel electroresistance (TER), and the strength of magnetoelectric coupling.
More details: https://www.imt.ro/COMPFER

Skills

Computational Methods: Density Functional Theory (DFT), DFT+NEGF, electronic transport, multiscale modeling, machine learning for materials.

Programming & Software: Python, C, MPI, Linux, LaTeX, high-performance computing environments.

Languages: English (Fluent), Romanian (Native).

Certifications

Driving License, Category B 2016

Honors and Awards

University of Bucharest Senate Award 2023
Award for the best scientific article: "Capacitive and inductive effects in perovskite solar cells: The different roles of ionic current and ionic charge accumulation".

Research Activity

Nr. of publications: 12 (peer-reviewed articles in high-impact journals) `DFCTI-Filipoiu-Nicolae`
H-index: 6 and i10-index 3 (according to Google Scholar)
Citations: 85 (according to Google Scholar)
ORCID: `0000-0003-2480-3206`
Google Scholar Profile: `scholar.google.com`
Contribution to Conferences: 19 (oral and poster presentations) `DFCTI-Filipoiu-Nicolae`
Book Chapters: 1 **Preprints:** 4 **Research Grants:** 6 (as project member)

Publications

1. Nicolae Filipoiu and George Alexandru Nemnes, "Prediction of equilibrium phase, stability and stress-strain properties in Co-Cr-Fe-Ni-Al high entropy alloys using artificial neural networks". *Metals*,10, 1569, (2020).

2. Claudiu Locovei, Nicolae Filipoiu, Andrei Kuncser, Anda-Elena Stancin, Ştefan Antohe, Camelia-Florina Florica, Andreea Costas, Ionuţ Enculescu, Luc Piraux,Victor Kuncser and Vlad-Andrei Antohe, "Unidirectional Magnetic Anisotropy in Dense Vertically-Standing Arrays of Passivated Nickel Nanotubes". *Nanomaterials*, 10, 2444, (2020).

3. George Alexandru Nemnes, Nicolae Filipoiu and Valentin Sipica, "Feature selection procedures for combined density functional theory—artificial neural network schemes". *Physica Scripta*, 96, 065807, (2021).

4. Nicolae Filipoiu, Tudor Luca Mitran, Dragos Victor Anghel, Mihaela Florea, Ioana Pintilie, Andrei Manolescu, and George Alexandru Nemnes. "Investigation of optoelectronic properties and stability of mixed-cation mixed-halide perovskite materials with machine-learning implementation". *Energies*, 14, 5431, (2021).

5. Nicolae Filipoiu, Amanda Teodora Preda, Dragos-Victor Anghel, Roxana Patru, Rachel Elizabeth Brophy, Movaffaq Kateb, Cristina Besleaga, Andrei Gabriel Tomulescu, Ioana Pintilie, Andrei Manolescu, et al. "Capacitive and inductive effects in perovskite solar cells: The different roles of ionic current and ionic charge accumulation". *Physical Review Applied*, 18, 064087, (2022).

6. Calin-Andrei Pantis-Simut, Amanda Teodora Preda, Nicolae Filipoiu, Alaa Allosh, and George Alexandru Nemnes. "Electric-field control in phosphorene based heterostructures". *Nanomaterials*, 12, 3650, (2022).

7. Nicolae Filipoiu, Anca G Mirea, Sarah Derbali, Calin-Andrei Pantis-Simut, Dragos-Victor Anghel, Andrei Manolescu, Ioana Pintilie, Mihaela Florea, and George Alexandru Nemnes. "Optoelectronic and stability properties of quasi-2D alkylammonium based perovskites". *Physical Chemistry Chemical Physics*, 25, 332-3331, (2023).

8. Mihaela Cosinschi, Amanda Teodora Preda, Calin Pantis-Simut, Nicolae Filipoiu, Ioan Ghitiu, Mihnea Alexandru Dulea, Lucian Ion, Andrei Manolescu, and George Alexandru Nemnes. "Collective dynamics of Ca atoms encapsulated in C60 endohedral fullerenes". *Physical Chemistry Chemical Physics*, 26, 22090-22098, (2024).

9. Alaa Allosh, Calin-Andrei Pantis-Simut, Nicolae Filipoiu, Amanda Teodora Preda, George Necula, Ioan Ghitiu, Dragos-Victor Anghel, Mihnea Alexandru Dulea, and George Alexandru Nemnes. "Tuning phosphorene and MoS2 2D materials for detecting volatile organic compounds associated with respiratory diseases". *RSC Advances*, 14, 1803-18123, (2024).

10. Filipoiu Nicolae, Neculai Plugaru, Titus Sandu, Rodica Plugaru and George Alexandru Nemnes. "First principles electron transport in magnetoelectric $SrRuO_3/BaTiO_3/SrTiO_3/SrRuO_3$ interfaces." *Nanotechnology* , 36, 075702, (2025).

11. Anca G. Mirea, Ioana D. Vlaicu, Sarah Derbali, Florentina Neatu, Andrei G.Tomulescu, Cristina Besleaga, Monica Enculescu, Andrei C. Kuncser, Alexandra C. Iacoban, Nicolae Filipoiu, Marina Cuzminschi, George A. Nemnes, Andrei Manolescu, Mihaela Florea, and Ioana Pintilie. "Electron transporting bilayers for perovskite solar cells: spray coating deposition of c-TiO_2/m-SnO_2-quantum dots". *Colloids and Surfaces A: Physicochemical and Engineering Aspects*, 705, 135508, (2025).

12. Calin-Andrei Pantis-Simut, Cosinschi Mihaela, Allosh Alaa, Filipoiu Nicolae, Preda Amanda Teodora, Necula George, Visan Camelia, Ghitiu Ioan, Nemnes Georege Alexandru. "Multiscale Modeling of Phosphorene-Based Sensing Devices for Volatile Organic Compounds". *ACS Applied Nano Materials*, 8(34),16792-16801, (2025).

Book Chapter

1. Tudor Luca Mitran, Rachel Elizabeth Brophy, Marina Cuzminschi, Nicolae Filipoiu, Movaffaq Kateb, Ioana Pintilie, Andrei Manolescu, and George Alexandru Nemnes. "Ab initio studies on perovskites". *Low-Dimensional Halide Perovskites*. Elsevier, 2023, pp. 153-185. (Book chapter)

Lista de lucrări

1. Nicolae Filipoiu and George Alexandru Nemnes. *"Prediction of equilibrium phase, stability and stress-strain properties in Co-Cr-Fe-Ni-Al high entropy alloys using artificial neural networks."* *Metals* 10, 1569 (2020).

2. Lucovei Claudiu*, **Nicolae Filipoiu***, Andrei Kuncser, Anda-Elena Stanciu, Stefan Antohe, Camelia-Florina Florica, Andreea Costas et al. *"Unidirectional Magnetic Anisotropy in Dense Vertically-Standing Arrays of Passivated Nickel Nanotubes."* *Nanomaterials* 10, 2444 (2020).
* authors with equal contribution

3. Nemnes George Alexandru, **Nicolae Filipoiu**, and Valentin Sipica. *"Feature selection procedures for combined density functional theory—artificial neural network schemes."* *Physica Scripta* 96, 065807 (2021).

4. Nicolae Filipoiu, Tudor Luca Mitran, Dragos Victor Anghel, Mihaela Florea, Ioana Pintilie, Andrei Manolescu, and George Alexandru Nemnes. *"Investigation of opto-electronic properties and stability of mixed-cation mixed-halide perovskite materials with machine-learning implementation"*. Energies 14, 5431 (2021).

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9. Mihaela Cosinschi, Amanda Teodora Preda, Calin-Andrei Pantis-Simut, **Nicolae Filipoiu**, Ioan Ghitiu, Mihnea Alexandru Dulea, Lucian Ion, Andrei Manolescu, and George Alexandru Nemnes. *"Collective dynamics of Ca atoms encapsulated in C_{60} endohedral fullerenes"*. Physical Chemistry Chemical Physics 26, 22090-22098 (2024).

10. Anca G. Mirea, Ioana D. Vlaicu, Sarah Derbali, Florentina Neatu, Andrei G.Tomulescu, Cristina Besleaga, Monica Enculescu, Andrei C. Kuncser, Alexandra C. Iacoban, **Nicolae Filipoiu**, Marina Cuzminschi, George A. Nemnes, Andrei Manolescu, Mihaela Florea, and Ioana Pintilie. *"Electron transporting bilayers for perovskite solar cells: spray coating deposition of c-TiO_2/m-SnO_2 quantum dots"*. Colloids and Surfaces A: Physicochemical and Engineering Aspects 705, 135508 (2025).

11. Nicolae Filipoiu, Neculai Plugaru, Titus Sandu, Rodica Plugaru, and George Alexandru Nemnes. *"First principles electron transport in magnetoelectric $SrRuO_3$/$BaTiO_3$/$SrTiO_3$/$SrRuO_3$ interfaces."* Nanotechnology 36, 075702 (2025).

12. Pantis-Simut Calin-Andrei, Cosinschi Mihaela, Allosh Alaa, **Filipoiu Nicolae**, Preda Amanda Teodora, Necula George, Visan Camelia, Ghitiu Ioan and Nemnes George Alexandru, *" Multiscale Modeling of Phosphorene-Based Sensing Devices for Volatile Organic Compounds"*.ACS APPLIED NANO MATERIALS 8(34), 16792-16801(2025)

ANEXA 1

STANDARDE MINIMALE APLICABILE ÎN CADRUL IFIN-HH
pentru acordarea gradelor profesionale de
Cercetător debutant (Cercetător științific - CS) si
Cercetător recunoscut (Cercetător științific gr. III - CS III)

Aprobate în ședința Consiliului Științific IFIN-HH din data de 27.02.2025 (Hotărârea CS nr. 5 / 27.02.2025)

Standarde minimale (IFIN-HH)

1) IFIN-HH stabilește punctaje de prag (P_{prag}) conform tabelului de mai jos.

	Cercetător Debutant (CS)	Cercetător Recunoscut (CSIII)
P_{prag}	0.50	1.50

2) În procesul evaluării activității științifice a candidatului se determină punctajul P astfel:

$P=P_1+P_2$, unde

P_1 : pentru articole la care candidatul este autor, dar nu este prim-autor sau autor corespondent;

P_2 : pentru articole la care candidatul este prim autor sau autor corespondent:

a_i = este scorul de influență absolut (Article influence score) al revistei științifice în care a fost publicat articolul i, corespunzător anului de publicare al acestuia conform http://www.eigenfactor.org/ pentru articole publicate până în 2006 și Journal Citation report (Web of Science) începând cu anul 2007; în cazul în care anul de publicare nu se găsește în baza de date se va alege anul cel mai apropiat.

= reprezintă numărul efectiv de autori ai elementului i și se determină astfel:

n_i	dacă $n_i \leq 5$
$(n_i + 5)/2$	dacă $5 < n_i \leq 15$
$(n_i + 15)/3$	dacă $15 < n_i \leq 75$
$(n_i + 45)/4$	dacă $n_i > 75$

unde n_i este în general numărul de autori ai elementului i. În cazul publicațiilor din domeniul HEPP (High Energy Particle Physics) cu număr mare de autori, dacă articolul are la bază o notă internă a colaborării și candidatul este coautor al acestei note interne, atunci poate fi dat numărul de autori din nota internă.

Calitatea de prim-autor sau autor corespondent se stabilește pe baza mențiunilor din articol. Nu se iau în considerare în acest sens articolele la care autorii sunt indicați în ordinea alfabetică a numelui și candidatul este prim-autor exclusiv datorită numelui acestuia și ordonării alfabetice. În cazul publicațiilor HEPP cu număr mare de autori, dacă articolul are la bază o notă internă a cărei aprobare în vederea trimiterii la publicare a fost susținută de către autor, atunci autorul este considerat prim autor.

Fișa de autoevaluare aferentă standardelor minimale:

Categorie de articole	Poziția în lista de lucrări	Punctaj	Detalii de calcul
1) Articole în reviste cotate ISI Thomson Reuters și în volume indexate ISI Proceedings pentru care candidatul nu este prim autor sau autor corespondent	3	0.182	AIS 0.547 Nr. Autori: 3 Nr. LF: 3
	5	0.142	AIS 0.712 Nr. Autori: 5 Nr. LE: 5
	8	0.089	AIS 0.623 Nr. Autori: 9 Nr. LE: 7
	9	0.085	AIS 0.596 Nr. Autori: 9 Nr. LE: 7
	10	0.067	AIS 0.671 Nr. Autori: 15 Nr. LE: 10
	12	0.123	AIS 0.862 Nr. Autori: 9 Nr. LE: 7
2) Articole în reviste cotate ISI Thomson Reuters și în volume indexate ISI Proceedings pentru care candidatul este prim autor sau autor corespondent	1	0.384	AIS 0.384 Nr. Autori: 2 Nr. LE: 2
	2	0.756	AIS 0.756 Nr. Autori: 11 Nr. LE: 8
	4	0.444	AIS 0.444 Nr. Autori:7 Nr. LE: 6
	6	1.401	AIS 1.401 Nr. Autori: 11 Nr. LE: 8
	7	0.624	AIS 0.624 Nr. Autori: 9 Nr. LE: 7
	11	0.462	AIS 0.462 Nr. Autori: 5 Nr. LE: 5
TOTAL		4,76	