Eduardo Pitthan Filho - Curriculum July 2025

Researcher
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Date of birth: July 5th, 1987.
Nationality: Brazilian/Swedish

Professional Experience

April 2019-Ongoing: Researcher.
Local: Materials Physics division, Department of Physics and Astronomy - Uppsala University, Uppsala-Sweden.
Projects: Ion beam analysis for characterization of surface layers; in-situ growth, modification, and characterization of fusion materials; studies on ion-solid interaction.

April 2017 to March 2018/December 2018 to March 2019: Postdoctoral Researcher.
Local: Physics Department, Universidade Federal do Rio Grande do Sul, UFRGS, Brazil.
Project: Synthesis and Modification of MoS_2 monolayer grown by CVD.

March 2017-December 2018: Teaching position as Interim Professor.
Local: Phys. Chemistry Department - Universidade Federal do Rio Grande do Sul, Brazil.

Academic Formation

2013-2017: PhD in Microelectronics
University: Universidade Federal do Rio Grande do Sul, UFRGS-Brazil.
Thesis: Investigation of Defects and Passivation Methods for the SiO_2/SiC Interface.
Supervisor: Fernanda C. Stedile.

2015: Visiting PhD student
University: Inst. of Adv. Mater. Dev. Nanotech., Rutgers University, New Jersey-USA.
Supervisor: Leonard C. Feldman.

2011-2013: Masters in Microelectronics
University: Universidade Federal do Rio Grande do Sul, UFRGS-Brazil.
Master Thesis: SiO_2 Films Deposited and Thermally Grown on SiC: Electrical and Physico-Chemical Characterization.
Supervisor: Fernanda C. Stedile.

2006-2010: B.S. in Chemistry
University: Universidade Federal do Rio Grande do Sul, UFRGS-Brazil.
Supervisor: Fernanda C. Stedile.

Research interests

1. *In-situ* investigation of material modifications for nuclear fusion applications.
2. Fundamental studies related to ion interaction with matter.
3. Surface and interfacial chemistry of materials for application in electronic devices.
4. Synthesis and modification of novel 2D materials (*i.e.* MoS_2-monolayer).
5. Application of Ion Beam Analysis for materials characterization.

University Teaching and Supervision

University Teaching
2025-ongoing: Responsible for problem-solving lessons in *Technical Thermodynamics*.
2025-ongoing: Subject Reviewer in *Degree project in Nuclear Power Engineering*.
2023-ongoing: Teaching and co-organizer in PhD course *Ion Beam Materials Analysis*.
2023-ongoing: Mentor in course *Independent Project in Engineering Physics*.
2022-ongoing: Assistant for computational assignments in *Technical Thermodynamics*.
2017-2018: Teaching *Experimental Physical Chemistry* as Interim Professor (975 h).

PhD Students
2025-ongoing: Athanasios Bamidis, PhD student, Uppsala University (main supervisor).
Project title: Investigation of plasma-facing components using low energy ions.

2024-ongoing: Daniel N. Gautam, PhD student, Uppsala University (main supervisor).
Project title: Formation and modification of plasma-facing materials using ion beams.

2020-2024: Philipp Mikka Wolf, PhD student at Uppsala University (co-supervisor).
Thesis: Advancing *in-situ* studies using low-energy ions.

2020-2024: Jila Shams-Latifi, PhD student at Uppsala University (co-supervisor).
Thesis: Interactions of low-energy ions with plasma-facing materials.

Master and Project Students
2025-ongoing: Osiaye Adebija, master student, Uppsala University (main supervisor).
Project title: Experimental investigation of energy losses of energetic ions in matter.

2022: Stylianos Kioumourtzoglou, Master student (15 credits - main supervisor).
Title: Oxygen containing yttrium and gadolinium hydride on quartz crystal microbalance system: formation and in-situ characterization by ion beam analysis.

2022: Carlos Fernández Pascual, Bachelor student (5 credits Project - main supervisor).
Title: Growth and characterization of thin EUROFER97 films.

2020: Philipp Mikka Wolf, degree of Masters at Uppsala University (main supervisor).
Title: In-situ characterization of ultra-thin Ni silicides using low-energy ion scattering.

University pedagogical training
2025: *Supervising Students for Degree Projects***,** Uppsala University (2 weeks full-time).
2024: *Academic Teacher Training Course*, Uppsala University (5 weeks full-time).
2024: *Supervising Doctoral Students*, Uppsala University (3 weeks full-time).
2020: *Doctoral Supervisor Training within the Faculty of Science and Technology*, Uppsala University (2 days full-time).

Research Grants & External Funding

2025 - Bergh foundation grant as main applicant (≈ 3 490 EUR).
2024-2027 - *Energimyndigheten* grant as co-applicant (2 363 577 EUR).
2024-2025 - EUROfusion project as main applicant and PI (376 818 EUR).
2024 - Bergh foundation grant as main applicant (≈ 3 652 EUR).
2024-2026 - FAPERGS-Brazil grant as external collaborator (≈ 252 310 EUR).
2023 - Swedish Centre for Nuclear Technology grant as co-applicant (437 688 EUR).
2022 - Bergh foundation grant at main applicant (≈ 4 035 EUR).
2022 - Liljewalch foundation travel grant as main applicant (≈ 2 201 EUR).
2021-2024 - EUROfusion project as Principal Investigator (587 878 EUR).
2020 - Liljewalch foundation travel grant as main applicant (≈ 1 420 EUR).
2017 - INCT & Tecnologia de Engenharia de Superfícies postdoc-grant (≈ 15 100 EUR).
2015 - Science without Borders (MSI-Brazil) scholarship for PhD abroad (≈ 6 100 EUR).

Honors, awards, and merits

2026 - Invited lecture at the *16th International Conference on Modern Materials and Technologies* (Perugia, Italy).
2025 - Invited talk at the *20th International Conference on Plasma-Facing Materials and Components for Fusion Applications* (Ljubljana, Slovenia).
2025 - Invited highlight talk at the *EUROfusion Work Package Plasma-Wall Interaction and Exhaust Meeting* (Prague, Czech Republic).
2024 - Approved (2nd place) for associate professor in physics with specialization in ion beam-based materials physics at Uppsala University.
2023 - Invited talk at the *International Conference on Research and Applications of Plasmas* (Warsaw, Poland).
2023 - Invited talk as highlight user at the Final Meeting of *RADIATE* (Split, Croatia).
2022 - Invited talk at the *X Conferencia Latinoamericana de Colisiones Inelásticas en la Materia* (Salta, Argentina).
2020 - Finalist from 66 candidates for the Associate Professor position in experimental materials physics at the University of Helsinki, Faculty of Science.
2016 - 1st place for Electronic Technology Specialist at State Semiconductor Company (chemical cleaning and etching processes/diffusion and doping processes), RS-Brazil.
2010 - Award for excellent academic achievement, Chemistry Institute at Universidade Federal do Rio Grande do Sul, Porto Alegre-Brazil.
2009 - Award for best presentation, Materials Chemistry Session, Scientific Research Meeting at Universidade Federal do Rio Grande do Sul, Porto Alegre-Brazil.

Reviewer Activity

Total number of manuscripts as reviewer: 20.

- *Materials and Interfaces*.
- *Materials Research and Technology*.
- *Nuclear Materials and Energy*.
- *Nuclear Instr. Meth. Phys. Res. B.*
- *Vacuum*.
- *Applied Surface Science.*
- *Radiation Physics and Chemistry*.
- *Applied Physics A*.
- *Scientific Instruments*.
- *Electronic Letters*.

List of Publications

Total Publications: 45.
Total Publications and patents as 1st author: 17.
Patents: 1.

Submitted for publication:

- **E. Pitthan**, M. Fellinger, B. Burazor Domazet, P. M. Wolf, J. Shams-Latifi, F. Aumayr, D. Primetzhofer, Interaction of light ions with plasma-facing materials: Improved experimental accuracy and its impact on sputter yield simulations (*submitted for publication*).

- D. N. Gautam, T. T. Tran, M. Fellinger, F. Aumayr, M. Rubel, D. Primetzhofer, **E. Pitthan**, Deuterium retention in sputter-deposited W-B layers: in-situ implantation and ion beam analysis during annealing (*submitted for publication*).

- M. Fellinger, **E. Pitthan**, D. Gautam, D. Primetzhofer, F. Aumayr, Influence of redeposited tungsten and EUROFER97 layers on deuterium retention in plasma-facing materials (*submitted for publication*).

- P. M. Wolf, **E. Pitthan**, Z. Zhang, T. T. Tran, R. Holeňák, D. Primetzhofer, Probing formation and epitaxy of ultrathin Titanium Silicide using low and medium energy ion scattering (*submitted for publication*).

- D. A. K. Coutinho, V. V. de Castro; V. R. dos Santos, H. Hatwig, **E. Pitthan**, C. Aguzzoli, Antonio M. H. de Andrade; C. F. Malfatti, Simultaneous formation of Zn and Ti oxides on nanostructured coatings produced via Plasma Electrolytic Oxidation (PEO) on Ti6Al4V (*submitted for publication*).

List of Publications:

1. P. M. Wolf, **E. Pitthan**, D. Primetzhofer, Experimentally determined interatomic potentials in low-energy atomic collisions relevant for nuclear fusion. Physical Review A, **111**, 042812, 2025.

2. E. Ponomareva, **E. Pitthan**, M. V. Moro, B. Bruckner, P. Bauer, F. Munnik, R. Heller, R. N. Palacio, D. Primetzhofer, A. E. Sand, Role of alloying and defects in light ion energy dissipation in iron. Physical Review B, **112**, 014313, 2025.

3. J. Brötzner, H. Biber, P. S. Szabo, N. Jäggi, L. Fuchs, A. Nenning, M. Fellinger, G. Nagy, **E. Pitthan**, D. Primetzhofer, A. Mutzke, R. A. Wilhelm, P. Wurz, A. Galli, F. Aumayr, Sputter Yields of the Lunar Surface: Experimental Validation and Numerical Modelling of Solar Wind Sputtering of Apollo 16 Soils. Communications Earth & Environment, **6**, 1, 2025.

4. A. Zubayer, F. Eriksson, M. Falk, M. Lorentzon, J. Palisaitis, C. Klauser, G. Nagy, P. Wolf, **E. Pitthan**, R. Holenak, D. Primetzhofer, G. Stenning, A. Glavic, J. Stahn, S. Dorri, P. Eklund, J. Birch, N. Ghafoor, The Role of $^{11}B_4C$ Interlayers in Enhancing Fe/Si Multilayer Performance for Polarized Neutron Mirrors. The Journal of Physical Chemistry C, **129,** 7921, 2025.

5. P. M. Wolf, **E. Pitthan**, and D. Primetzhofer, Experimental electronic stopping cross section of titanium for slow hydrogen, deuterium, and helium ions. Nuclear Instruments & Methods in Physics Research Section B, **555**, 165471, 2024.

6. J. Shams-Latifi, **E. Pitthan**, and D. Primetzhofer, Experimental electronic stopping cross-section of EUROFER97 for slow protons, deuterons and helium ions. Radiation Physics and Chemistry, **224**, 112073, 2024.

7. D. Moldarev, **E. Pitthan**, M. Wolff, D. Primetzhofer, Effects of H vacancies on photochromic properties of oxygen-containing yttrium hydride. Nuclear Instruments & Methods in Physics Research Section B, **555**, 165486, 2024.

8. M. Bullmann, L. Etcheverry, A.C. Suárez, E.J.P. Sampaio, **E. Pitthan**, A.M.H. de Andrade, C. de Fraga Malfatti, Tailored PEO synthesis and in-situ ATR-FTIR study of $PtSnO_2$/Nb coral-like structures for application in ethanol electrooxidation. Journal of Alloys and Compounds, **1002**, 175178, 2024.

9. E. Ponomareva, **E. Pitthan**, R. Holeňák, J. Shams-Latifi, G. Pádraig Kiely, D. Primetzhofer, and A. Sand, Local electronic excitations induced by low-velocity light ion stopping in tungsten. Physical Review B, **109**, 165123, 2024.

10. J. Gotardi, D. A. Pilger, S. C. Baggio Gnoatto, R. Hubler, **E. Pitthan**, L. P. Etcheverry, F. Bernardi, C. de Fraga Malfatti, Free-standing sodium niobate nanowires film: morphological and chemical characterization. Surfaces and Interfaces, **54**, 105223, 2024.

11. J. Shams-Latifi, **E. Pitthan**, T. T. Tran, R. Kaur, and D. Primetzhofer, Sputter-deposition of ultra-thin film stacks from EUROFER97 and tungsten: characterisation and interaction with low-energy D and He ions. Materials Research Express, **11**, 016518, 2024.

12. **E. Pitthan**, T. T. Tran, D. Moldarev, M. Rubel, D. Primetzhofer, Influence of thermal annealing and of the substrate on sputter-deposited thin films from EUROFER97 on tungsten, Nuclear Materials and Energy, **35**, 101449, 2023.

13. **E. Pitthan**, P. Petersson, T. T. Tran, D. Moldarev, R. Kaur, J. Shams-Latifi, P. Ström, M. Hans, M. Rubel, D. Primetzhofer, Thin films sputter-deposited from EUROFER97 in argon and deuterium atmosphere: Material properties and deuterium retention. Nuclear Materials and Energy, **34**, 101375, 2023.

14. **E. Pitthan**, C. Cupak, M. Fellinger, M. V. Moro, S. Kioumourtzoglou, D. Moldarev, M. Wolff, F. Aumayr, D. Primetzhofer, In-situ, real-time investigation of the formation of oxygen-containing rare-earth hydrides by combining a quartz crystal microbalance and ion beam analysis. Materialia, **27**, 101675, 2023.

15. J. Shams-Latifi, **E. Pitthan**, P. M. Wolf, and D. Primetzhofer, Experimental electronic stopping cross-section of tungsten bulk and sputter-deposited thin films for slow protons, deuterons and helium ions. Nuclear Materials and Energy, **36**, 101491, 2023.

16. P. M. Wolf, D. Nueβ, T. T. Tran, **E. Pitthan**, M. Hans, J. M. Schneider, and D. Primetzhofer, An in situ ToF-LEIS characterization of the surface of Ti-based thin films under oxygen exposure and at elevated temperatures. Applied Surface Science, **638**, 158076, 2023.

17. L. Dittrich, P. Petersson, H. Laabadi, **E. Pitthan**, M. Rubel, A. Widdowson, A. Krawczynska, K. Szlązak, and Ł. Ciupinsk, Impact of ion irradiation and film deposition on optical and fuel retention properties of Mo polycrystalline and single crystal mirrors. Nuclear Materials and Energy, **37**, 101548, 2023.

18. A. Kretschmer, F. Bohrn, H. Hutter, **E. Pitthan**, T. T. Tran, D. Primetzhofer, P. H. Mayrhofer, Analysis of (Al,Cr,Nb,Ta,Ti)-nitride and -oxynitride diffusion barriers in Cu-Si interconnects by 3D-Secondary Ion Mass Spectrometry. Materials Characterization, **197**, 112676, 2023.

19. C. Cupak, **E. Pitthan**, M. V. Moro, M. Fellinger, D. Primetzhofer, F. Aumayr, Retention of deuteriumin beryllium: A combined investigation using TDS, ERDA and EBS. Nuclear Materials and Energy, **33**, 101249, 2022.

20. P. M. Wolf, **E. Pitthan**, Z. Zhang, C. Lavoie, T. T. Tran, and D. Primetzhofer, Direct transition from ultrathin orthorhombic dinickel silicides to epitaxial nickel disilicide revealed by in-situ synthesis and analysis. Small, 2106093, 2022.

21. J. Shams-Latifi, P. Ström, **E. Pitthan**, and D. Primetzhofer, An in-situ ToF-LEIS and AES study of near-surface modifications of the composition of EUROFER97 induced by thermal annealing. Nuclear Materials and Energy, **30**, p. 101139, 2022.

22. A. Kretschmer, A. Kirnbauer, **E. Pitthan**, D. Primetzhofer, K. Yalamanchili, H. Rudigier, and P. Heinz Mayrhofer, High-entropy alloy inspired development of compositionally complex superhard (Hf,Ta,Ti,V,Zr)-B-N coatings. Materials & Design, **218**, 110695, 2022.

23. D. Moldarev, C. Aracheloff, M. V. Moro, **E. Pitthan**, M. Wolff, and D. Primetzhofer, Oxygen mobility in yttrium hydride films studied by isotopic labelling, EPJ Web of Conferences, **261**, 01001, 2022.

24. A. Bahr, T. Glechner, T. Wojcik, A. Kirnbauer, M. Sauer, A. Foelske, O. Hunold, J. Ramm, S. Kolozsvari, E. Ntemou, **E. Pitthan**, D. Primetzhofer, H. Riedl, and R. Hahn, Non-reactive HiPIMS deposition of NbC_x thin films: Effect of the target power density on structure-mechanical properties. Surface & Coatings Technology, **444**, 128674, 2022.

25. **E. Pitthan**, M.V. Moro, S.A. Corrêa, and D. Primetzhofer, Assessing boron quantification and depth profiling of different boride materials using ion beams. Surface and Coatings Technology, **417**, 127188, 2021.

26. B. Bakhit, D. Primetzhofer, **E. Pitthan**, M. A. Sortica, E. Ntemou, J. Rosen, Lars Hultman, I. Petrov, G. Greczynski, Systematic compositional analysis of sputter-deposited boron-containing thin films, Journal of Vacuum Science & Technology A: Vacuum, Surfaces, and Films, **39**, 063408, 2021.

27. T. Glechner, O. E. Hudak, T. Wojcik, L. Haager, F. Bohrn, H. Hutter, O. Hunold, J. Ramm, S. Kolozsvári, **E. Pitthan**, D. Primetzhofer, and H Riedl, Influence of the non-metal species on the oxidation kinetics of Hf, HfN, HfC, and HfB_2 coatings, Materials & Design, **211**, 110136, 2021.

28. S.A. Corrêa, **E. Pitthan**, M.V. Moro, and D. Primetzhofer, A multipurpose set-up using keV ions for nuclear reaction analysis, high-resolution backscattering spectrometry, low-energy PIXE and in-situ irradiation experiments. Nuclear Instruments & Methods in Physics Research Section B, **478**, 104-110, 2020.

29. G. Copetti, E. H. Nunes, T. O. Feijó, E.R.F. Gerling, **E. Pitthan**, G.V. Soares, M. Segala, C. Radtke, Tuning MoS_2 reactivity toward halogenation, Journal of Materials Chemistry C, **7**, 14672-14677, 2019.

30. **E. Pitthan**, E.R.F. Gerling, T.O. Feijó, C. Radtke, G.V. Soares, Annealing Response of Monolayer MoS_2 Grown by Chemical Vapor Deposition, ECS Journal of Solid-State Science and Technology, P267-P270, 2019.

31. **E. Pitthan**, V.P. Amarasinghe, C. Xu, A.L. Gobbi, G.H.S. Dartora, T. Gustafsson, L.C. Feldman, F.C. Stedile, Chemical state of phosphorous at the SiC/SiO_2 interface. Thin Solid Films, **675**, 172-176, 2019.

32. **E. Pitthan**, V.P. Amarasinghe, C. Xu, T. Gustafsson, F.C. Stedile, L.C. Feldman, 4H-SiC Surface Energy Tuning by Nitrogen Up-take. Applied Surface Science, **402**, 192-197, 2017.

33. G. H. Dartora, **E. Pitthan**, F. C. Stedile, Unraveling the mechanisms responsible for the interfacial region formation in 4H-SiC dry thermal oxidation. Journal of Applied Physics, **122**, 215301, 2017.

34. **E. Pitthan**, R. Dos Reis, S. A. Corrêa, D. Schmeisser, G. V. Soares, H. I. Boudinov, F. C. Stedile, Influence of CO annealing in metal-oxide-semiconductor capacitors with SiO_2 films thermally grown on Si and on SiC. Journal of Applied Physics, **119**, 025307, 2016.

35. **E. Pitthan**, A. L. Gobbi, F. C. Stedile, Investigation of phosphorous in thin films using the $^{31}P(\alpha,p)^{34}S$ nuclear reaction. Nuclear Instruments & Methods in Physics Research Section B, **371**, 220, 2016.

36. **E. Pitthan**, A. L. Gobbi, H. I. Boudinov, F. C. Stedile, SiC Nitridation by NH_3 Annealing and its Effects in MOS Capacitors with Deposited SiO_2 Films. Journal of Electronics Materials, **44**, 2823, 2015.

37. **E. Pitthan**, S. A. Corrêa, G. V. Soares, C. Radtke, F. C. Stedile, Synthesis and applications of ^{18}O standards for nuclear reaction analysis. Nuclear Instruments & Methods in Physics Research Section B, **332**, 56, 2014.

38. S. A. Corrêa, **E. Pitthan**, G. V. Soares, F. C. Stedile, Tracing the incorporation of water in SiO_2/SiC structures formed by oxide deposition and thermal oxidation. Nuclear Instruments & Methods in Physics Research Section B, **332**, 19, 2014.

39. **E. Pitthan**, S. A. Corrêa, G. V. Soares, H. I. Boudinov, F. C. Stedile, SiO_2/SiC structures annealed in $D_2{}^{18}O$: Compositional and electrical effects. Applied Physics Letters, **104**, 111904, 2014.

40. **E. Pitthan,** L. D. Lopes, R. Palmieri, S. A. Corrêa, G. V. Soares, H. I. Boudinov, F. C. Stedile, Influence of thermal growth parameters on the SiO_2/4H-SiC interfacial region. APL Materials, **1**, 022101, 2013.

41. **E. Pitthan**, R. Palmieri, S. A. Corrêa, G. V. Soares, H. I. Boudinov, F. C. Stedile, The Role Played in the Improvement of the SiO_2/SiC Interface by a Thin SiO_2 Film Thermally Grown Prior to Oxide Film Deposition, ECS Solid State Letters, **2**, P8, 2013.

42. F. C. Stedile, **E. Pitthan**, R. Palmieri, S. A. Corrêa, G. V. Soares, H. I. Boudinov, Alternative Routes to Minimize Electrical Degradation in 4H-SiC MOS Capacitors, 28th Symposium on Microelectronics Technology and Devices, 2013.

43. F. C. Stedile, C. Radtke, G. V. Soares, **E. Pitthan**, R. Palmieri, S. A. Corrêa, SiO_2/SiC Interfacial Region: Presence of Silicon Oxycarbides and Effects of Hydrogen Peroxide and Water Vapor Thermal Treatments. Silicon Carbide and Related Materials 2011, **747**, 717-720, 2012.

44. **E. Pitthan**, S. A. Corrêa, R. Palmieri, G. V. Soares, H. I. Boudinov, F. C. Stedile, Improvement in the SiO_2/4H-SiC interfacial region by thermal treatments with hydrogen peroxide. Silicon Carbide and Related Materials 2011, **753**, 717-720, 2012.

45. **E. Pitthan**, S. A. Corrêa, R. Palmieri, G. V. Soares, H. I. Boudinov, F. C. Stedile, Effect of Reoxidations and Thermal Treatments with Hydrogen Peroxide in the SiO_2/SiC Interfacial Region. Electrochemical and Solid-State Letters, **14**, H368, 2011.

Patent Granted:

E. Pitthan, S. A. Corrêa, C. Radtke, G. V. Soares, F. C. Stedile. "*Synthesis process to obtain oxygen-18 standards with passivation layer in a substrate*". **Original Name:** Processo de Síntese de Padrões de Oxigênio-18 com Barreira Passivadora em um Substrato. BR102012026044-1. **Granted:** May 19th, 2020.