Curriculum vitae di Federico Rosei

Sottosettori ERC primari: *PE11_12*
Eventuali sottosettori ERC secondario: *PE11_7*

PERSONAL DETAILS

Family name, First name: Rosei, Federico
Birthdate: 27/03/1972
Researcher unique identifier(s) (such as ORCID, Research ID, etc. ...): **0000-0001-8479-6955**

- **Education and key qualifications**

2001 PhD: Science / Physics, University of Rome La Sapienza, Italy
Name of PhD Supervisor: Adalberto Balzarotti
1996 Master (Laurea): Science / Physics, University of Rome La Sapienza, Italy

- **Current position(s)**

2023/03 – Present Professor of Industrial Chemistry, Department of Chemical and Pharmaceutical Sciences, University of Trieste, Italy

- **Previous position(s)**

- 2009–2023 Full Professor, Centre for Energy, Materials and Telecommunications (CEMT), Institut National de la Recherche Scientifique (INRS), Montreal, Canada
- 2013–2023 UNESCO Chair Materials and Technologies for Energy Conversion, Saving and Storage
- 2016–2023 Senior Canada Research Chair (CRC) in Nanostructured Materials
- 2011–2019 Director of the CEMT, INRS
- 2004–2009 Associate Professor, CEMT, INRS
- 2003–2013 Junior CRC in Nanostructured Organic and Inorganic Materials
- 2002–2004 Assistant Professor, CEMT, INRS
- 2000–2002 Post-Doctoral Fellow & Marie Curie Fellow, University of Aarhus, Denmark

RESEARCH ACHIEVEMENTS AND PEER RECOGNITION

Research achievements

JOURNAL ARTICLES (521)
Citation metrics: H-index – 91, i-10 index – 422, Total Citations – 29,401 (Google Scholar Sept. 4th, 2025)

20. Y. Zhou, D. Benetti, Z. Fan, H. Zhao, D. Ma, A. Govorov, A. Vomiero, **F. Rosei***, Near Infrared, Highly Efficient Luminescent Solar Concentrators, Adv. En. Mater. 6, 1501913 (2016). (Frontispiece Cover) This article reports the synthesis of near infrared (NIR) core/shell PbS/CdS Quantum Dots (QDs) via a cation exchange approach. The QDs exhibit high quantum yield and excellent chemical/photostability with large Stokes shift (compared to bare QDs). By integrating the QDs into Luminescent Solar Concentrators (LSCs), we obtain an optical efficiency of 6.1% for geometric factor G=10, a record in planar LSCs based on NIR QDs.

19. H. Zhao, A. Vomiero, **F. Rosei***, Ultrasensitive, Biocompatible, Self-Calibrating, Multi-Parametric Temperature Sensors, Small 11, 5741–5746 (2015). (Frontispiece Cover) This paper reports the synthesis of core/thick shell PbS/CdS QDs with double emission, in which the ratio of the emission peaks varies linearly with temperature in a wide range (150–273 K). The system therefore acts as multiparametric temperature sensor with high sensitivity and record performance.

18. R. Nechache, C. Harnagea, S. Li, L. Cardenas, W. Huang, J. Chakrabartty, **F. Rosei***, Bandgap tuning of multiferroic oxide solar cells, Nature Photonics 9, 61–67 (2015). This paper reports an 8.1% power conversion efficiency in a ferroelectric photovoltaic device, currently the world record in the field.

17. S. Li, J. Zhang, M.G. Kibria, Z. Mi, M. Chaker, D. Ma, R. Nechache, **F. Rosei***, Remarkably Enhanced Photocatalytic Activity of Laser Ablated Au Nanoparticles Decorated $BiFeO_3$ (BFO) Nanowires under Visible-light, Chem. Comm. 49, 5856–5858 (2013). This paper reports a simple solution synthesis of a photoanode nanocomposite made of BFO nanowires decorated with Au nanocrystals. The Au nanocrystals enhance O_2 evolution by a factor of 30 compared to bare BFO nanowires.

16. L. Dinca, C. Fu, J.M. Macleod, J. Lipton-Duffin, J. Brusso, C. Szakacs, D. Ma, D.F. Perepichka, **F. Rosei***, Unprecedented Transformation of Tetrathienoanthracene into Pentacene on Ni(111), ACS Nano 7, 1652–1657

(2013). This paper reports the synthesis of pentacene from tetrathienoanthracene precursors on Ni(111). The reaction, imaged with submolecular resolution by scanning tunneling microscopy, consists of sulfur abstraction and cyclization. It has no known literature analogue.

15. R. Nechache, C. Harnagea, S. Licoccia, E. Traversa, A. Ruediger, A. Pignolet, **F. Rosei***, Photovoltaic properties of Bi_2FeCrO_6 epitaxial thin films, Appl. Phys. Lett. 98, 202902 (2011). This letter demonstrates the proof-of-concept of ferroelectric photovoltaic effect in the double perovskite inorganic oxide BFCO, effectively opening a new direction in the field.

14. J. Lipton-Duffin, J. Miwa, M. Kondratenko, F. Cicoira, B. Sumpter, V. Meunier, D. Perepichka, **F. Rosei***, Step-by-step growth of epitaxially aligned polythiophene by surface-confined reaction, Proc. Nat. Acad. Sci. USA 107, 11200–11204 (2010). This paper demonstrates the surface-confined growth of ordered arrays of poly(3,4-ethylenedioxythiophene) (PEDOT) chains, by using the substrate (the 110 facet of copper) simultaneously as template and catalyst for polymerization. Copper acts as promoter for Ullmann coupling, whereas the anisotropy of the fcc 110 facet confines growth to one dimension.

13. C. Yan, L. Nikolova, A. Dadvand, C. Harnagea, A. Sarkissian, D.F. Perepichka, D. Xue, **F. Rosei***, Multiple $NaNbO_3/Nb_2O_5$ Heterostructure Nanotubes: A New Class of Ferroelectric/Semiconductor Nanomaterials, Adv. Mater. 22, 1741–1745 (2010). This paper demonstrates the synthesis of 1D nanotubes of Nb_2O_5 containing disks of $NaNbO_3$. The resulting material is shown to be multifunctional, exhibiting simultaneous ferroelectric and semiconducting properties.

12. J. Lipton-Duffin, O. Ivasenko, D.F. Perepichka, **F. Rosei***, Synthesis of polyphenylene molecular wires by surface confined polymerization, Small 5, 592–597 (2009). [Front Cover] This paper is the first demonstration of the Ullmann coupling reaction on a single crystal surface, leading to 1D conjugated polymers starting from di-halo-benzene precursors.

11. K.G. Nath, O. Ivasenko, J.A. Miwa, H. Dang, J.D. Wuest, A. Nanci, D.F. Perepichka, **F. Rosei***, Rational Modulation of the Periodicity in Linear Hydrogen-Bonded Assemblies of Trimesic Acid on Surfaces, J. Am. Chem. Soc. 128, 4212–4213 (2006). This paper demonstrates the co-adsorption of an acid and an alcohol, forming a 1D pattern at the solid/liquid interface on graphite.

10. M. Zhang, F. Li, D. Benetti, R. Nechache, Q. Wei, X. Qi, **F. Rosei***, Ferroelectric Polarization-enhanced Charge Separation in Quantum Dots Sensitized Semiconductor Hybrid for Photoelectrochemical Hydrogen Production, Nano Energy 81, 105626 (2021). This paper reports the fabrication of a solar hydrogen cell which does not require an external electrical field, since the photoanode is a hybrid material composed of $BaTiO_3$ (ferroelectric, has an intrinsic field) and TiO_2.

9. G. Galeotti, F. De Marchi, E. Hamzepoor, O. MacLean, R.R. Malakalapalli, Y. Chen, L.V. Besteiro, D. Dettmann, L. Ferrari, F. Frezza, P. Sheverdyaeva, R. Liu, A. Kundu, P. Moras, M. Ebrahimi, M. Gallagher, **F. Rosei***, D.F. Perepichka, G. Contini, Synthesis of mesoscale ordered 2D π-conjugated polymers with semiconducting properties, Nature Mater. 19, 874–880 (2020). [***Front Cover***] This paper reports the largest (mesoscale) 2D conjugated polymers to date.

8. X. Liu, B. Luo, J. Liu, D. Jing, D. Benetti, **F. Rosei***, Eco-friendly quantum dots for liquid luminescent solar concentrators, J. Mater. Chem. A 8, 1787–1798 (2020). This paper demonstrates "green" Quantum Dots and their use as chromophores in solar windows that use a waveguide in liquid state.

7. G. Galeotti, F. De Marchi, T. Taerum, L.V. Besteiro†, M. El Garah, J. Lipton-Duffin, M. Ebrahimi, D.F. Perepichka, **F. Rosei***, Surface-mediated assembly, polymerization and degradation of thiophene-based monomers, Chem. Sci. 10, 5167–5175 (2019). This paper describes a surface confined polymerization reaction using thiophone as building blocks.

6. H. Zhao, H. Zhang, G. Liu, X. Tong, J. Liu, G.S. Selopal, Y. Wang, Z.M. Wang, S. Sun, **F. Rosei***, Ultra-small Colloidal Heavy-metal-free Nanoplatelets for Efficient Hydrogen Generation, Appl. Cat. B 250, 234–241 (2019). This paper describes the synthesis of non-toxic nanoscale platelets and their use for photoelectrochemical hydrogen generation from water.

5. Y. Zhou, D. Benetti, X. Tong, L. Jin, Z.M. Wang, D. Ma, H. Zhao, **F. Rosei***, Colloidal Carbon Dots based Highly Stable Luminescent Solar Concentrators, Nano Energy 44, 378–387 (2018). This paper describes the synthesis of carbon dots and their use as chromophores in solar windows.

4. X. Tong, X.-T. Kong, Y. Zhou, F. Navarro-Pardo, G. Singh Selopal, S. Sun, A.O. Govorov, H. Zhao, Z.M. Wang, **F. Rosei***, Near-infrared, Heavy Metal-free Colloidal "Giant" Core/Shell Quantum Dots, Adv. En. Mater. 8, 1701432 (2018). This paper describes the synthesis of core-shell Quantum Dots and their use as photoabsorbers in optoelectronic devices.

3. X. Tong, Y. Zhou, L. Jin, K. Basu, R. Adhikari, G. Singh Selopal, X. Tong, H. Zhao, S. Sun, A. Vomiero, Z.M. Wang, F. Rosei, Heavy Metal-free, Near-infrared Colloidal Quantum Dots for Efficient Photoelectrochemical Hydrogen Generation, Nano Energy 31, 441 (2017). This paper describes non-toxic quantum dot photoabsorbers for hydrogen generation from water.

2. F. Li, D. Benetti, M. Zhang, L. Shi, J. Feng, Q. Wei, F. Rosei, Tunable 0D/2D/2D nanocomposite based on green Zn-doped $CuInS_2$ Quantum Dots and MoS_2/rGO as photoelectrodes for solar hydrogen production, ACS Appl. Mat. Int. 14, 54790–54802 (2022). This paper describes a hybrid photoanode which combines Quantum Dots with 2D systems, used for photoelectrochemical hydrogen generation from water.

1. R. Adhikari, L. Jin, F. Navarro Pardo, D. Benetti, B. AlOtaibi, S. Vanka, H. Zhao, Z. Mi, A. Vomiero, F. Rosei, High Efficiency, Pt-free Photoelectrochemical Cells for Solar Hydrogen Generation based on "Giant" Quantum Dots, Nano Energy 27, 265 (2016). This paper describes the use of "giant" Quantum Dots in photoelectrochemical cells for hydrogen generation from water, without the use of Pt counterelectrodes.

Peer recognition
(* denotes awards for scientific excellence combined with commitment to education and/or outreach)
International awards (selected from 28 in total)

2025	Nano Energy Award
2024	Nanotechnology Recognition Award, American Vacuum Society
2023	Fellowship, John Simon Guggenheim Memorial Foundation
	*Spirit of Salam Award, The Abdus Salam International Centre for Theoretical Physics
2022	Nano Energy Advances Award, Nano Energy Advances Journal
2021	*Brimacombe Medal, TMS
	Wolfson Visiting Fellowship, The Royal Society
2020-2023	World's Top 2% Scientists, Stanford University
2019	*Blaise Pascal Medal, Materials Science Division, European Academy of Sciences
	*John Wheatley Award, American Physical Society
2018	ACerS Global Ambassador, American Ceramic Society
	Fulbright Visiting Chair, USA/Canada Fulbright Foundation
	Selby Fellowship, Australian Academy of Sciences
2015	*Excellence in Mentorship, American Vacuum Society
	Khwarizmi International Award [**the most prestigious scientific award in Iran**]
	Chang Jiang Chair Professor, People's Republic of China [**highest academic award issued to an individual in higher education by China's Ministry of Education**]
2014	*José Vasconcelos Award for Education, World Cultural Council
2010	Friedrich Wilhelm Bessel Award, Alexander von Humboldt Foundation

National awards (Canada & Italy) (selected from 20 in total)

2023	*Knight of the National Order of Quebec, Government of Quebec
	TK Sham Award in Materials Chemistry, Canadian Society for Chemistry
2022	Julian C. Smith Medal, Engineering Institute of Canada
	Premio nazionale «Gentile da Fabriano», Associazone Gentile Premio
	Brockhouse Medal, Canadian Association of Physicists
2021	Prix Urgel Archambault, ACFAS
	Prix du Québec "Marie Victorin", Ministère de l'Économie et l'Innovation (Québec) [**highest scientific distinction awarded by the Government of Québec**]
2017	Outstanding Engineer Award, IEEE Canada
2016	John C. Polanyi Award, Canadian Society for Chemistry
2015	Lash Miller Award, Canada Section, Electrochemical Society
2014	Award for Excellence in Materials Chemistry, Canadian Society for Chemistry
	EWR Steacie Memorial Fellowship, Government of Canada
2013	Herzberg Medal, Canadian Association of Physicists
2011	Rutherford Memorial Medal (Chemistry), Royal Society of Canada

Memberships/fellowships in major national/international academies (selected from 13 in total)

2024 Foreign Member, Royal Flemish Academy of Belgium for Science and the Arts
2022 Foreign Fellow, ASEAN Academy of Engineering and Technology
2021 Member, European Academy of Sciences and Arts
2018 Foreign Member, Academia Europaea
2015 Fellow, Canadian Academy of Engineering
2014 Fellow, Royal Society of Canada
Member (Fellow), European Academy of Sciences

Memberships/fellowships in major learned societies (selected from 22 in total)

2024 Fellow, Materials Research Society
2021 Fellow, American Ceramic Society
2018 Fellow, Optica
2015 Honorary Fellow, Chinese Chemical Society; Fellow, ASM International; Fellow, SPIE
2014 Fellow, American Physical Society
2012 Fellow, American Association for the Advancement of Science

Distinguished Lectureships

2025 IEEE Nanotechnology Council
2022– IEEE Electron Devices Society
2020–2022 IEEE Photonics Society
2018–2020 Sigma Xi Society
2015&2016 IEEE Nanotechnology Council

ADDITIONAL INFORMATION

Other contributions to the research community

Supervision of graduate students

Supervised about 200 trainees from 47 countries; **34 alumni are now professors in 14 countries**
57 Postdocs/ 51 PhD / 12 MSc / 44 Summer students / 21 Visiting Scholars / 6 Research Associates

Teaching activities

2023- Chemistry of Macromolecules I (undergraduate)
Renewable Energy Technologies (MSc)
2005-2012 Materials Characterization Techniques (graduate)
2003-2012 Properties of Materials (graduate)
2003-2023 Survival Skills for Scientists (professional development, not offered every year)

Organization of scientific meetings

155 meetings in 29 countries including Co-chairing:

2020-2023 Symposium on Materials for Energy Conversion and Storage, Brazil
2012-2025 Symposium on Advanced Materials for Photonics and Energy, USA
2021 World Conference on Nanotechnology and Materials, China
2019 Symposium on Materials for Energy Conversion, Saving and Storage, Tanzania

Reviewing and editorial activities

2023- Inaugural Editor in Chief, RSC Applied Interfaces
2023- Associate Editor, Materials Genome Engineering Advances
2014-2023 Associate Editor, Journal of Material Chemistry C
2020-2023 Associate Editor, Materials Advances
2012-2014 Editor, Applied Surface Science

Advisory Board Member (from 18 journals in total)

J. Mater. Chem. C, Mater. Adv., Appl. Surf. Science, Ceram. Int., Nanomaterials

Peer reviewer (from 31 international funding agencies in total)

National Science Foundation (USA), European Research Council, CINECA (Italy), Canada Research Chairs, Hong Kong Research Grants Council, NSERC (Canada), ANR (France), Australian Research Council (ARC), SFI (Ireland), SNF (Swiss National Science Foundation)

Journal refereeing (from 101 in total)
Science, Nature, Nature Mater., Nature Chem., Nature Phot., Nature Comm., Nature Energy, Nature Phys., Science Advances, Angew. Chemie, J Am Chem Soc, Adv. Sci., Nanoscale, Small, Adv. Mater., Adv. Func. Mater., Adv. Energy Mater.

Major collaborations with researchers in 40 countries yielding >250 papers, including:
D.F. Perepichka, Department of Chemistry, McGill University, supramolecular chemistry at surfaces, 2D conjugated polymers
Creation of UNESCO Chair MATECSS: network including 50 researchers from 22 countries
Participation in WIROX, INTERNEW and LESIA European networks

Industrial partnerships
- Over $4.2M in Academic / Industry grants
- Over 25 industrial collaborations, including: Canadian Solar inc., Pi-Sol Technologies inc. and IREQ

Career breaks, diverse career paths and major life events
During the candidate's studies, military service was still compulsory in Italy. As such, Federico Rosei served as Officer in the Italian Navy (10/1996–12/1997, just after completing the Laurea degree), which caused an inevitable delay in his research activities, which were at the very beginning.