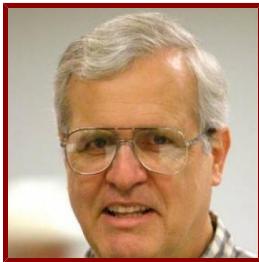


Stanford



Piero Pianetta

Professor (Research) of Photon Science and of Electrical Engineering
Photon Science Directorate

Bio

BIO

Pianetta's research is directed towards understanding how the atomic and electronic structure of semiconductor interfaces impacts device technology pertaining to advanced semiconductors and photocathodes. His research includes the development of new analytical tools for these studies based on the use of synchrotron radiation. These include the development of ultrasensitive methods to analyze trace impurities on the surface of silicon wafers at levels as low as 1e-6 monolayer (~1e8 atoms/cm²) and the use of various photoelectron spectroscopies (X-ray photoemission, NEXAFS, X-ray standing waves and photoelectron diffraction) to determine the bonding and atomic structure at the interface between silicon and different passivating layers. Recent projects include the development of high resolution (~30nm) x-ray spectromicroscopy with applications to energy materials such as Li batteries.

ACADEMIC APPOINTMENTS

- Professor (Research), Photon Science Directorate
- Professor (Research), Electrical Engineering
- Member, Bio-X

ADMINISTRATIVE APPOINTMENTS

- Deputy Chief Research Officer, SLAC, (2020- present)
- Chair, Photon Science, SLAC, (2016-2020)
- Deputy Director for SSRL, SLAC, (2014- present)
- Director (Interim) for SSRL, SLAC, (2012-2014)
- Deputy Director for SSRL, SLAC, (2010-2012)
- Director (Acting) for SSRL, SLAC, (2009-2010)
- Deputy Director for SSRL, SLAC, (2005-2009)
- Assistant Director for SSRL, SLAC, (1993-2005)
- Associate Director, Stanford Synchrotron Radiation Laboratory, (1985-1993)

HONORS AND AWARDS

- Fellow, American Physical Society (2006)

BOARDS, ADVISORY COMMITTEES, PROFESSIONAL ORGANIZATIONS

- Chair, Experimental Systems Advisory Committee, Advanced Photon Source, Argonne National Laboratory (2015 - present)

PROFESSIONAL EDUCATION

- PhD, Stanford University , Applied Physics (1977)
- MS, Stanford University , Applied Physics (1973)
- BS, Santa Clara University , Physics (1971)

PATENTS

- L. Hesselink, R.F.W. Pease, P. Pianetta, J.R. Maldonado, ^ Cheng, J. Ryan. "United States Patent 9,520,260 Photo emitter x-ray source array (PeXSA)", The Board of Trustees of the Leland Stanford Junior University, Palo Alto, CA (US), Dec 13, 2016
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LINKS

- My SLAC faculty information: <https://faculty.slac.stanford.edu/photon-science-faculty-bios#Pianetta>
- My Google Scholar Page: https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=piero+pianetta&btnG=

Teaching

COURSES

2023-24

- The Electronic Structure of Surfaces and Interfaces: EE 329 (Aut)

2021-22

- The Electronic Structure of Surfaces and Interfaces: EE 329, PHOTON 329 (Aut)

STANFORD ADVISEES

Postdoctoral Faculty Sponsor

Zhihengyu Chen, Monty Cosby, Christopher Crain, Erick Espinosa Villatoro, Oliver Hoidn, Heemin Lee, Zhilin Liang, Otavio Marques, Sikhumbuzo Masina, Anjani Maurya, Neha Sharma

Doctoral (Program)

Maximus Di Perna, Melanie Murillo, Charlotte Wehner

Publications

PUBLICATIONS

- **Asynchronous domain dynamics and equilibration in layered oxide battery cathode.** *Nature communications*
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- **Nanoscale chemical imaging with structured X-ray illumination.** *Proceedings of the National Academy of Sciences of the United States of America*
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- **The S-T component in the Si 2p photoemission spectrum from H-terminated and oxidized Si (001) surfaces** *JOURNAL OF VACUUM SCIENCE & TECHNOLOGY A*
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• **Exploring the Ultrafast Charge-Transfer and Redox Dynamics in Layered Transition Metal Oxides** *CONDENSED MATTER*

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• **Perspective-Morphology and Dynamics of Metal Dendrites in Batteries Revealed by X-ray Computed Tomography** *JOURNAL OF THE ELECTROCHEMICAL SOCIETY*

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• **In-Situ Visualization of the Transition Metal Dissolution in Layered Cathodes** *JOURNAL OF ELECTROCHEMICAL ENERGY CONVERSION AND STORAGE*

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• **Data-Driven Lithium-Ion Battery Cathode Research with State-of-the-Art Synchrotron X-ray Techniques** *ACCOUNTS OF MATERIALS RESEARCH*

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• **Deep-Learning-Enabled Crack Detection and Analysis in Commercial Lithium-Ion Battery Cathodes** *ADVANCED FUNCTIONAL MATERIALS*

Fu, T., Monaco, F., Li, J., Zhang, K., Yuan, Q., Cloetens, P., Pianetta, P., Liu, Y.
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• **Dynamics of particle network in composite battery cathodes.** *Science (New York, N.Y.)*

Li, J., Sharma, N., Jiang, Z., Yang, Y., Monaco, F., Xu, Z., Hou, D., Ratner, D., Pianetta, P., Cloetens, P., Lin, F., Zhao, K., Liu, et al
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• **Structural, Dynamic, and Chemical Complexities in Zinc Anode of an Operating Aqueous Zn-Ion Battery** *ADVANCED ENERGY MATERIALS*

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• **Probing lattice defects in crystalline battery cathode using hard X-ray nanoprobe with data-driven modeling** *ENERGY STORAGE MATERIALS*

Li, J., Hong, Y., Yan, H., Chu, Y. S., Pianetta, P., Li, H., Ratner, D., Huang, X., Yu, X., Liu, Y.
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• **Structural and chemical evolution in layered oxide cathodes of lithium-ion batteries revealed by synchrotron techniques.** *National science review*

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• **Deep-learning-based image registration for nano-resolution tomographic reconstruction.** *Journal of synchrotron radiation*

- Fu, T., Zhang, K., Wang, Y., Li, J., Zhang, J., Yao, C., He, Q., Wang, S., Huang, W., Yuan, Q., Pianetta, P., Liu, Y.
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 - **Depth-dependent valence stratification driven by oxygen redox in lithium-rich layered oxide.** *Nature communications*
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 - **Hybrid real- and reciprocal-space full-field imaging with coherent illumination** *JOURNAL OF OPTICS*
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 - **Hierarchical Defect Engineering for LiCoO₂ through Low-Solubility Trace Element Doping** *CHEM*
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 - **Mutual modulation between surface chemistry and bulk microstructure within secondary particles of nickel-rich layered oxides.** *Nature communications*

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- Operando Revealing Dynamic Reconstruction of NiCo Carbonate Hydroxide for High-Rate Energy Storage *JOULE*

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- Simultaneous three-dimensional elemental mapping of Hollandite and Pyrochlore material phases in ceramic waste form materials *JOURNAL OF THE AMERICAN CERAMIC SOCIETY*

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- Quantification of Heterogeneous Degradation in Li-Ion Batteries *ADVANCED ENERGY MATERIALS*

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- High-Voltage Charging-Induced Strain, Heterogeneity, and Micro-Cracks in Secondary Particles of a Nickel-Rich Layered Cathode Material *ADVANCED FUNCTIONAL MATERIALS*

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2018; 25 (Pt 6): 1819–26

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 - **Intensity modulation of the Shirley background of the Cr 3p spectra with photon energies around the Cr 2p edge** *SURFACE AND INTERFACE ANALYSIS*
Herrera-Gomez, A., Cabrera-German, D., Dutoi, A. D., Vazquez-Lepe, M., Aguirre-Tostado, S., Pianetta, P., Nordlund, D., Cortazar-Martinez, O., Torres-Ochoa, A., Ceballos-Sanchez, O., Gomez-Munoz, L.
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 - **Finding a Needle in the Haystack: Identification of Functionally Important Minority Phases in an Operating Battery** *NANO LETTERS*
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 - **In situ Visualization of State-of-Charge Heterogeneity within a LiCoO₂ Particle that Evolves upon Cycling at Different Rates** *ACS ENERGY LETTERS*
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 - **Applications of x-ray tomography across multiple length scales**
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