STEFFI Y. WOO

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Date of Birth: January 24, 1986
Citizenship: Canadian

Education

McMaster University	Hamilton ON, Canada	Materials Engineering	**Ph.D.**	*August 2017*
McMaster University	Hamilton ON, Canada	Materials Engineering	**M.A.Sc.**	*October 2011*
McMaster University	Hamilton ON, Canada	Materials Engineering & Society	**B.Eng.Soc.**	*April 2009*

Research Experience

R&D Associate *June 2023 – Present*
Center for Nanophase Materials Science, Oak Ridge National Laboratory, Oak Ridge, USA
- Research Area: Interlayer coupling and interactions in atomically-thin 2D materials

(NSERC) Post-Doctoral Researcher *October 2017 – March 2023*
Laboratoire de Physiques des Solides, Université Paris-Saclay, Orsay, France
- Research Area: Defect luminescence of *h*-BN, single photon emitters in transition metal dichalcogenides
- Cathodoluminescence and electron energy-loss spectroscopy in a scanning transmission electron microscope of localized luminescence from WSe_2 monolayers and *h*-BN defect centres

Research Scientist/Ph.D. Thesis *2011 – 2017*
Department of Materials Science & Engineering, McMaster University, Hamilton ON, Canada
- Thesis title: Anomalous Structural Variations in III-Nitride Nanowire Heterostructures and Their Corresponding Optical Properties

Visiting Researcher Laboratoire de Physiques des Solides, Orsay, France *February 2015 – May 2015*

Visiting Researcher CEA-Minatec, Grenoble, France *January 2013 – March 2013*

Master's Thesis McMaster University Materials Science & Engineering Department *2009 – 2011*
- Thesis title: Characterization of Extended Defects in Heteroepitaxy of GaSb/Si Thin Films with Conventional Transmission Electron Microscopy

Research Interests

- Advanced electron microscopy and electron spectroscopy
- Low-dimensionality structures (semiconductor nanowires, atomically-thin two-dimensional materials)
- Atomic- and nano-scale structure–property relationships of (defect) optical response
- Physics of electron–matter interactions

Scholarships and Awards

Natural Sciences and Engineering Research Council Post-Doctoral Fellowship *October 2017 – October 2019*
European Microscopy Congress Young Scientist Scholarship (at EMC Meeting) *August 2016*
17th Canadian Semiconductor Science and Technology Conference Best Oral Presentation *August 2015*
NSERC Alexander Graham Bell Canada Graduate Scholarship *September 2013 – August 2015*
International Federation of Societies for Microscopy Young Scientist Award *September 2014*
Microanalysis Society Distinguished Scholar Award (at M&M Meeting) *July 2012*

During Ph.D.: awarded **2** scholarships totalling $30,000 CAD for personal funding over 2 years from provincial agencies, **6** additional awards for research and conference travel totalling more than $14,500 CAD from international, national and institutional agencies, and **3** other awards of distinction from institutional agencies.

(Selected) Publications

1. N. Varkentina, Y. Auad, **S.Y. Woo**, F. Castioni, J.-D. Blazit, M. Tencé, H.-C. Chang, J. Chen. K. Watanabe, T. Taniguchi, M. Kociak, L.H.G. Tizei. (2023) "Excitation lifetime extracted from electron-photon (EELS-CL) nanosecond-scale temporal coincidences", Applied Physics Letters, 123, 223502.
2. **S.Y. Woo**, A. Zobelli, R. Schneider, A. Arora, J.A. Preuß, B.J. Carey, S. Michaelis de Vasconcellos, M. Palummo, R. Bratschitsch, L.H.G. Tizei. (2023) "Excitonic absorption signatures of twisted bilayer WSe_2 by electron energy-loss spectroscopy", Physical Review B, *107*(15), 155429. [Editor's Suggestion]
3. N. Varkentina*, Y. Auad*, **S.Y. Woo**, A. Zobelli, L. Bocher, J.-D. Blazit, X. Li, M. Tencé, K. Watanabe, T. Taniguchi, O. Stéphan, M. Kociak, L.H.G. Tizei. (2022) "Cathodoluminescence excitation spectroscopy: nanoscale imaging of excitation pathways", Science Advances, 8(40), eabq4947. *equal contributions
4. F. Shao, **S.Y. Woo**, N. Wu, R. Schneider, A.J. Mayne, S. Michaelis de Vasconcellos, A. Arora, B.J. Carey, J.A. Preuß, N. Bonnet, M. Och, C. Mattevi, K. Watanabe, T. Taniguchi, Z. Niu, R. Bratschitsch, L.H.G. Tizei. (2022) "Substrate influence on transition metal dichalcogenide monolayer exciton absorption linewidth broadening", Physical Review Materials, 6, 074005.
5. N. Bonnet, H.Y. Lee, F. Shao, **S.Y. Woo**, J.-D. Blazit, K. Watanabe, T. Taniguchi, A. Zobelli, O. Stéphan, M. Kociak, S. Gradečak-Garaj, L.H.G. Tizei. (2021) "Nanoscale modification of WS_2 trion emission by its local electromagnetic environment", Nano Letters, *21*(24), 10178–10185.
6. Y. Kurman, R. Dahan, H. Herzig Shenfux, K. Wang, M. Yannai, Y. Adiv, O. Reinhardt, L.H.G. Tizei, **S.Y. Woo**, E. Janzen, J.H. Edgar, M. Kociak, F.H.L. Koppens, I. Kaminer. (2021) "Spatiotemporal imaging of 2D polariton wave packet dynamics using free electrons", Science, *372*(6547), 1181–1186.
7. S. Susarla, L.M. Sassi, A. Zobelli, **S.Y. Woo**, L.H.G. Tizei, O. Stéphan, P.M. Ajayan. (2021) "Mapping modified electronic levels in the moiré patterns in MoS_2/WSe_2 using low-loss EELS", Nano Letters, *21*(9), 4071–4077.
8. A. Zobelli, **S.Y. Woo**, A. Tararan, L.H.G. Tizei, N. Brun, X. Li, O. Stéphan, M. Kociak, M. Tencé. (2019) "Spatial and spectral dynamics in STEM hyperspectral imaging using random scan patterns", Ultramicroscopy, *212*, 112912.
9. A. Pofelski, **S.Y. Woo**, B.H. Le, X. Liu, S. Zhao, Z. Mi, S. Löffler, G.A. Botton. (2018) "2D strain mapping using scanning transmission electron microscopy moiré interferometry and geometrical phase analysis", Ultramicroscopy, 187, 1–12.
10. S. Zhao*, **S.Y. Woo***, M. Bugnet, X. Liu, J. Kang, G.A. Botton, Z. Mi. (2015) "Three-dimensional quantum confinement of charge carriers in self-organized AlGaN nanowires: a viable route to electrically injected deep ultraviolet lasers", Nano Letters, *15*(12), 7801–7807. *Equal contributions
11. **S.Y. Woo**, M. Bugnet, H.P.T. Nguyen, Z. Mi, G.A. Botton. (2015) "Atomic ordering in InGaN alloys within nanowire heterostructures", Nano Letters, *15*(10), 6413–6418.
12. **S.Y. Woo**, N. Gauquelin, H.P.T. Nguyen, Z. Mi, G.A. Botton. (2015) "Interplay of strain and indium incorporation in InGaN/GaN dot-in-a-wire nanostructures by scanning transmission electron microscopy", Nanotechnology, *26*, 344002.

Plus **19** other publications during post-doc (1), Ph.D. (14), and Master's (4), including **2** others as first-author.

Publications (in submission)

13. **S.Y. Woo**, F. Shao, A. Arora, R. Schneider, N. Wu, A.J. Mayne, C.-H. Ho, M. Och, C. Mattevi, A. Reserbat-Plantey, A. Moreno, H. Herzig Sheinfux, K. Watanabe, T. Taniguchi, S. Michaelis de Vasconcellos, F.H.L. Koppens, Z. Niu, O. Stéphan, M. Kociak, F. J. Garcìa de Abajo, R. Bratschitsch, A. Konečná, L.H.G. Tizei. (2023) "Engineering of two-dimensional material exciton lineshape with graphene/h-BN encapsulation", submitted to Nano Letters, arXiV:2311.07085.
14. N. Bonnet, J. Baaboura, F. Castioni, **S.Y. Woo**, C.-H. Ho, K. Watanabe, T. Taniguchi, L.H.G. Tizei, T. Coenen. (2023) "Cathodoluminescence emission from a 2D transition metal dichalcogenide in van der Waals heterostructures", submitted to Nanotechnology.

15. C. Cometto, G. Marafon, V. Celorrio, G. Garcia, **S.Y. Woo**, A. Zobelli, G. Bottaro, L. Armelao, E. Pastor, A. Moretto, L. Calvillo. (2024) "Covalent stabilization of copper porphyrin in a carbon nitride matrix for the photoelectrocatalytic reduction of CO2", submitted to Applied Catalysis B: Environment and Energy.

Publications (in preparation)

16. **S.Y. Woo**, F. Shao, N. Wu, R. Schneider, A. Arora, J.A. Preuß, S. Michaelis de Vasconcellos, A.J. Mayne, R. Bratschitsch, L.H.G. Tizei. (2023) "Strain relaxation and excitonic absorption in atomically-reconstructed moiré superlattices", in preparation.

Research Metrics

Google Scholar (12/2023): h-index **21**; 1594 citations; Scholar profile

Web of Science (12/2023) h-index **18**; 1138 citations; WoS profile

Invited Seminars and Conference Presentations

1. **S.Y. Woo**, F. Shao, A. Arora, R. Schneider, B.J. Carey, J.A. Preuß, S. Michaelis de Vasconcellos, F. J. Garcìa de Abajo, R. Bratschitsch, A. Konečná, L.H.G. Tizei. "Effects of coupling in atomically-thin transition metal dichalcogenides revealed by electron spectroscopies", Materials Research Society (MRS) Fall Meeting, Boston, MA, USA, November 2023.
2. **S.Y. Woo**, F. Shao, A. Zobelli, N. Wu, R. Schneider, A. Arora, J.A. Preuß, B.J. Carey, S. Michaelis de Vasconcellos, R. Bratschitsch, L.H.G. Tizei. "Uncovering nanoscale optical properties of transition metal dichalcogenides with electron spectroscopies", Center for Nanophase Materials Science seminar, Oak Ridge National Lab, Knoxville, TN, USA, December 2022.
3. **S.Y. Woo**, F. Shao, R. Schneider, J.A. Preuß, A. Arora, B.J. Carey, S. Michaelis de Vasconcellos, R. Bratschitsch, L.H.G. Tizei. "Uncovering nanoscale optical properties of transition metal dichalcogenides with electron spectroscopies", Microscopy & Microanalysis Meeting 2022, Portland, OR, USA, August 2022.
4. **S.Y. Woo**, F. Shao, R. Schneider, A. Arora, A. Zobelli, J.A. Preuß, B.J. Carey, S. Michaelis de Vasconcellos, F. J. Garcìa de Abajo, R. Bratschitsch, A. Konečná, L.H.G. Tizei. "Effects of coupling in atomically-thin transition metal dichalcogenides revealed by electron spectroscopies", Laboratoire de Physique des Solides Journée Axe 2, Université Paris-Saclay, Orsay, France, July 2022.
5. **S.Y. Woo**, F. Shao, R. Schneider, J.A. Preuß, A. Arora, B.J. Carey, S. Michaelis de Vasconcellos, R. Bratschitsch, L.H.G. Tizei. "Towards intrinsic exciton linewidths in atomically-thin transition metal dichalcogenides", Frontiers of Ultrahigh Energy Resolution Electron Energy Loss Spectroscopy, Hamilton, ON, Canada, June 2022.
6. **S.Y. Woo**, M. Bugnet, H.P.T. Nguyen, S. Zhao, Z. Mi, G.A. Botton. "Atomic-scale compositional fluctuations in ternary III-Nitride nanowires", European Microscopy Congress, Lyon, France, August 2016.

(Selected) Communications at International and National Conferences

In addition to the following list are other major contributions to invited talks at international conferences **(17)**, major contributions to oral presentations at international/national conferences **(17)**, first-presenting-author contributions to oral presentations at national conferences **(5)**, and first-author or major contributions to poster presentations at international/national conferences **(18)**.

1. **S.Y. Woo**, F. Shao, N. Wu, R. Schneider, A. Arora, J.A. Preuß, B.J. Carey, S. Michaelis de Vasconcellos, A.J. Mayne, R. Bratschitsch, L.H.G. Tizei. "Strain relaxation and excitonic absorption of atomically-reconstructed WSe_2 moiré superlattices", Microscopy & Microanalysis Meeting 2022, Portland, OR, USA, August 2022.
2. F. Shao, **S.Y. Woo**, N. Wu, R. Schneider, A.J. Mayne, S. Michaelis de Vasconcellos, A. Arora, B.J. Carey, J.A. Preuß, N. Bonnet, C. Mattevi, K. Watanabe, T. Taniguchi R. Bratschitsch, L.H.G. Tizei. "Disentangling exciton linewidth broadening factors in transition metal dichalcogenide monolayer with electron energy-loss spectroscopy", Microscopy & Microanalysis Meeting 2022, Portland, OR, USA, August 2022.

3. **S.Y. Woo**, R. Schneider, J.A. Preuß, A. Arora, B.J. Carey, S. Michaelis de Vasconcellos, A. Zobelli, R. Bratschitsch, L.H.G. Tizei. "Moiré angle dependent excitonic absorption in twisted bilayer WSe_2 by EELS", 12th Journée EELS, Münster, Germany, September 2021.
4. **S.Y. Woo**, F. Shao, R. Schneider, A. Arora, J.A. Preuß, B.J. Carey, S. Michaelis de Vasconcellos, R. Bratschitsch, L.H.G. Tizei. "Correlative luminescence and absorption spectroscopy from monolayer WSe_2 at the nanoscale", Microscopy & Microanalysis Meeting, presented in visioconference, August 2021.
5. **S.Y. Woo**, R. Schneider, J.A. Preuß, A. Arora, B.J. Carey, S. Michaelis de Vasconcellos, A. Zobelli, R. Bratschitsch, L.H.G. Tizei. "Moiré angle dependent excitonic absorption in twisted bilayer WSe_2 by EELS", Microscopy & Microanalysis Meeting, presented in visioconference, August 2021.
6. **S.Y. Woo**, R. Schneider, J.A. Preuß, A. Arora, B.J. Carey, S. Michaelis de Vasconcellos, A. Zobelli, R. Bratschitsch, L.H.G. Tizei. (2021) "Moiré angle dependent excitonic absorption in twisted bilayer WSe_2 by EELS", Electron Beam Spectroscopy for Nano-Optics 2021, presented in visioconference, June 2021.
7. **S.Y. Woo**, N. Bonnet, L.H.G. Tizei, M. Kociak, A. Zobelli. "Nanometric luminescence dynamics from defect color centers in *h*-BN", GDR-I Graphene & Co Lavoisier Discussion, Villard de Lans, France, January 2020.
8. **S.Y. Woo**, T. Mallah, V. Pecoraro, M. Kociak, O. Stéphan, A. Zobelli. "Luminescence from isolated Tb-based metallacrown molecular complexes on *h*-BN", Microscopy & Microanalysis Meeting, Portland, OR, USA, August 2019.
9. A. Zobelli, **S.Y. Woo**, L.H.G. Tizei, N. Brun, X. Li, A. Tararan, O. Stéphan, M. Kociak, M. Tencé. "Dynamic random scan approach of spectrum imaging for temporal evolution of spectroscopic signals", Microscopy & Microanalysis Meeting , Portland, OR, USA, August 2019.
10. **S.Y. Woo**, A. Zobelli, N. Brun, O. Stéphan, L.H.G. Tizei. "Atomic-scale chemical mapping and optical response of defects in *h*-BN", Journée Electron Energy-Loss Spectroscopy (JEELS), Porquerolles, France, June 2018. [poster presentation]

Supervisory Experience

February – March 2023	Scientific guidance and sample preparation training to Dr. Florian Castioni (Post-doc, Université Paris-Saclay), supervised by Dr. Luiz Tizei
2020 – January 2023	Scientific guidance to Dr. Fuhui Shao (Ph.D. student, Université Paris-Saclay), supervised by Dr. Luiz Tizei
January – March 2022	Scientific guidance and instrument training to Dr. Sai Bachu (visiting Ph.D. student, Penn State University), supervised by Prof. Nasim Alem
February – March 2021	Scientific guidance and instrument training to Ms. Laura Susanna (Ph.D. student, Université Paris-Saclay), supervised by Prof. Alberto Zobelli
October 2018 – May 2019	Scientific guidance and instrument training to Dr. Sandhya Susarla (visiting Ph.D. student, Rice University), supervised by Prof. Pulickel Ajayan
May – August 2018	Co-supervised Mr. Costantino Cosentino (Master's intern), with Prof. Alberto Zobelli
2015 – 2017	Scientific guidance to Dr. Alexandre Pofelski (Ph.D. student, McMaster University), supervised by Prof. Gianluigi Botton

Teaching Activities

2009 – 2015	Teaching Assistant, McMaster University – leading lectures, tutorials, laboratories for various Materials Science & Engineering courses, including thin film science, characterization of nanomaterials, materials manufacturing, and mechanical properties
2007 – 2009	Undergraduate Teaching Assistant, McMaster University – preparing lessons and demonstrations for computer-aided design software labs in engineering design course, leading drop-in help sessions for introductory materials properties course

External Services and Memberships

Journal reviewer	ACS Photonics, Nano Letters, ACS Nano, Chemical Physics Review
Scientific Society Membership	Microanalysis Society (MAS), Materials Research Society (MRS), French Microscopy Society (SFmu), and European Microscopy Society (EMS), Microscopy Society of Canada (MSC)