

# Peng Si, Ph.D.

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## **EDUCATION AND TRAINING**

<b>Stanford University</b> , Stanford, CA	2014–2019
<i>Postdoctoral Scholar—Molecular imaging</i>	<i>Advisor: Adam de la Zerda, Ph.D.</i>
<b>Nanyang Technological University</b> , Singapore	2009–2014
<i>Ph.D. in Bioengineering</i>	<i>Advisor: Donghwan (Richie) Kim, Ph.D.</i>
<b>Jilin University</b> , Changchun, China	2005–2009
<i>B.S. in Biotechnology</i>	

## **HONORS AND AWARDS**

World Molecular Imaging Congress (WMIC) Travel Award	2017, 2018, 2019
Stanford Medical School Dean’s Postdoctoral Fellowship Award (\$25,000)	2014
Chinese Government Award for Outstanding Self-financed Students Abroad (1/120 applicants)	2013
Nanyang Technological University Research Fellowship	2009
Jilin University Honored Graduate Award (1/60 students)	2009
Jilin University Outstanding Student Leadership Award (1/100 students)	2008

## **RESEARCH EXPERIENCE**

<b>Stanford University, School of Medicine</b> , Stanford, CA	2014–present
<i>Postdoctoral Scholar and Research Scientist</i>	

- Research summary: I pioneered the optical coherence tomography (OCT) molecular imaging field by developing several advanced nanoscale OCT contrast agents. These novel nanotechnological tools allow OCT, for the first time, to visualize the microvascular networks in the melanoma tumor, and to investigate the tumor lymphatic system in a multiplexed manner with greater depth.
- Research achievements: Received Dean’s Fellowship and published 6 peer-reviewed papers in high-impact journals including Nano Letters (cover story), ACS Nano, Trends in Cancer (Editors’ Pick), etc.

<b>Nanyang Technological University</b> , Singapore	2009–2014
<i>PhD candidate</i>	

- Research summary: I led the development of multiple novel nanostructured electrode materials for advanced biosensing applications. The nano- and nanohybrid-electrode materials I invented have mesoporous structures, large surface-to-volume ratio and high electrocatalytic activity, allowing sensitive monitoring of many metabolic molecules such as glucose, hydrogen peroxide and neurotransmitter dopamine in the physiological fluid.
- Research achievements: Published 10 peer-reviewed journal articles (8 first-authored) in high-impact journals such as ACS Nano, Biosensors and Bioelectronics, etc.

**PUBLICATIONS (n=21, #: Equal contribution, \*: Senior author, 18 peer-reviewed papers (14 first or senior authored), citations: 1313, h-index: 11)**

**Published work**

1. F. Chen<sup>#</sup>, P. Si<sup>#</sup>, A. de la Zerda, J. Jokerst, D. Myung, “Gold nanoparticles to enhance ophthalmic imaging”, *Biomaterials Science*, accepted
2. P. Si, A. Honkala, B. Smith and A. de la Zerda, “Optical Microscopy and Coherence Tomography of Cancer in Living Subjects”, *Trends in Cancer*, 2020, 6 (3), 205-222 *Featured in Trends Editors’ Pick*
3. P. Si, S. Shevidi, E. Yuan, K. Yuan, Z. Lautman, S. S. Jeffrey, G. W. Sledge and A. de la Zerda, “Gold Nanobipyramids as Second Near Infrared Optical Coherence Tomography Contrast Agents for *In Vivo* Multiplexing Studies”, *Nano Letters*, 2020, 20 (1), 101-108 *Featured as Cover Story and Recommended Reading Article. Highlighted in Molecular Imaging Program at Stanford*
4. E. Yuan<sup>#</sup>, P. Si<sup>#</sup>, S. Shevidi and A. de la Zerda, “A Spectral De-mixing Model for Triplex *In Vivo* Imaging of Optical Coherence Tomography Contrast Agents”, *ACS Photonics*, 2020, 7, 4, 893–900
5. P. Si, E. Yuan, O. Liba, S. Yousefi, Y. Winetraub, E. SoRelle, D. W. Yecies, A. de la Zerda, “Gold Nanoprisms as Optical Coherence Tomography Contrast Agents in the Second Near Infrared Window for Enhanced Angiography in Live Animals”, *ACS Nano*, 2018, 12 (12), 11986–11994 *Featured in Stanford Medicine’s Scope and Medgadget*
6. P. Si, S. Ding, J. Yuan, X. W. Lou and D. H. Kim, “Hierarchically Structured One-Dimensional TiO<sub>2</sub> for Protein Immobilization, Direct Electrochemistry and Mediator-Free Glucose Sensing”, *ACS Nano*, 2011, 5 (9), 7617-7626
7. P. Si, D. Sen, R. Dutta, S. Yousefi, Y. Winetraub, O. Liba, A. de la Zerda, “Molecular Optical Coherence Tomography of Lymphatic Vessel Endothelial Hyaluronan Receptors *In Vivo*”, *Nature Publishing Group: Scientific Reports*, 2017, 7(1), 1086.
8. Y. Rong, L. Song, P. Si\*, L. Zhang, X. Lu, J. Zhang, Z. Nie, Y. Huang, T. Chen, “Macroscopic Assembly of Gold Nanorods into Superstructures with Controllable Orientations by Anisotropic Affinity Interaction”, *Langmuir*, 2017, 33(48), 13867
9. P. Si, P. Kannan, L. Guo, H. Son and D. H. Kim, “Highly Stable and Sensitive Glucose Biosensor Based on Covalently Assembled High Density Au Nanostructures”, *Biosensors and Bioelectronics*, 2011, 26 (9), 3845-3851
10. P. Si, Y. Huang, T. Wang, and J. Ma, “Nanomaterials for Electrochemical Non-Enzymatic Glucose Biosensors”, *RSC Advances*, 2013, 3 (11), 3487-3502
11. P. Si, X.C. Dong, P. Chen and D.H. Kim, “Hierarchically Structured Composite of Mn<sub>3</sub>O<sub>4</sub>/3D Graphene Foam for flexible Nonenzymatic Biosensors”, *Journal of Materials Chemistry-B*, 2013, 1, 110-115 *Most Accessed Article of the year*
12. P. Si, P. Chen and D. H. Kim, “Electrodeposition of Hierarchical MnO<sub>2</sub> Spheres for Enzyme Immobilization and Glucose Biosensing”, *Journal of Materials Chemistry-B*, 2013, 1, 2696-2700

13. **P. Si**, “A ‘Nano’ Era for Blood Glucose Sensing”, *Asia Pacific Biotech News*, 2012, 16 (8), special issue on ‘Singapore’s Next-Gen Researchers’, 48-50, *Feature Article*
14. **P. Si**, H. Chen, P. Kannan and D. H. Kim, “Selective and Sensitive Determination of Dopamine by Composites of Polypyrrole and Graphene Modified Electrodes”, *Analytst*, 2011, 136 (24), 5134-5138
15. **P. Si**, S. Ding, X. W. Lou and D. H. Kim, “An Electrochemically Formed Three-dimensional Structure of Polypyrrole/Graphene Nanoplatelets for High-Performance Supercapacitors”, *RSC Advances*, 2011, 1 (7), 1271-1278
16. L. Chen, X. Zeng, **P. Si**, Y. Chen, Y. Chi, D. H. Kim and G. Chen, “Gold Nanoparticle-Graphite-Like C<sub>3</sub>N<sub>4</sub> Nanosheet Nanohybrids Used for Electrochemiluminescent Immunosensor”, *Analytical Chemistry*, 2014, 86 (9), 4188–4195
17. Z. Bai, R. Chen, **P. Si**, Y. Huang, H. Sun and D. H. Kim, “Fluorescent pH sensor based on Ag@SiO<sub>2</sub> core-shell nanoparticle”, *ACS Applied Materials & Interfaces*, 2013, 5 (12), 5856–5860
18. Q. Meng, X. Gao, **P. Si**, Z. Wang, G. Zhang and L. Teng, “Optimization of Ultrasonic Extraction of Active Components from *Psoralea corylifolia* L. Using Response Surface Methodology”, *Chemistry and Industry of Forest Products*, 2009, 29, 87-91

#### **Papers under revision, submission and preparation**

19. H. T. Toh, H. Amaravadhi, **P. Si**, D. H. Kim, and H. S. Yoon. “Molecular Basis of Alpha Synuclein Modulation by Immunophilin Ligands”, submitted
20. **P. Si**, N. Razmi, O. Nur, S. Solanki, C. M. Pandey, R. K. Gupta, B. D. Malhotra, M. Willander and A. de la Zerda, “Gold Nanomaterials for Optical Biosensing and Bioimaging”, submitted
21. P. Keahey<sup>#</sup>, **P. Si**<sup>#</sup>, S. Yu, T. Cannon, M. Villiger, A. de la Zerda, B. Bouma, “Polarization Enhanced Spectral Contrast for Optical Coherence Tomography”, in preparation

#### **PRESENTATIONS**

##### **Oral presentations**

1. **P. Si**, et al., “Gold Nanobipyramids as Optical Coherence Tomography Contrast Agents in the Second Near Infrared Window for Multiplexing Study of Tumor Lymphatic Flows”, *Photonics West*, Feb 2020, San Francisco, CA
2. **P. Si, et al.**, “Spectrally multiplexed detection of gold nanoparticles in optical coherence tomography enables wide-field lymph-angiography”, *Photonics West*, Feb 2020, San Francisco, CA
3. **P. Si**, et al., “Gold Nanoprisms Enhanced Optical Coherence Tomography Angiography of Live Animals in The Second Near Infrared Window”, *Photonics West*, Feb 2019, San Francisco, CA
4. **P. Si**, et al., “Gold Nanoprisms as Optical Coherence Tomography Contrast Agents for Contrast Enhanced Imaging of Tumor Microvasculatures *In Vivo*”, *MRS Fall Meeting*, Nov 2018, Boston, MA
5. **P. Si**, et al., “Contrast-enhanced Optical Coherence Tomography of Tumor Microvasculature *In Vivo*”, *Second International Symposium on Molecular Imaging*, Oct 2018, Zhuhai, China

6. **P. Si**, et al., “Gold Nanoprisms as Optical Coherence Tomography Contrast Agents for Enhanced Imaging of Tumor Microvasculatures *In Vivo*”, **World Molecular Imaging Congress**, Sep 2018, Seattle, WA *Selected as Highlight Lecture*
7. **P. Si**, et al., “Optical Coherence Tomography of Lymphatic Vessel Endothelial Hyaluronan Receptors *In Vivo*”, **Photonics West**, Jan 2018, San Francisco, CA
8. **P. Si**, et al., “*In Vivo* Imaging of Molecular Dynamics of Lymphatic Vessel Endothelial Hyaluronan Receptors during Inflammation with Optical Coherence Tomography”, **World Molecular Imaging Congress**, Sep 2017, Philadelphia, PA *Selected as Highlight Lecture*
9. **P. Si**, et al., “Molecular Optical Coherence Tomography of Lymphatic Vessel Biomarkers *In Vivo*”, **Canary Early Detection Summit**, May 2016, Stanford, CA
10. **P. Si** and D. H. Kim, “Mesoporous Carbon Nanocages for Biosensing Applications”, **7<sup>th</sup> International Conference on Materials for Advanced Technologies (ICMAT 2013)**, July 2013, Singapore
11. **P. Si**, et al., “Copper/enzyme Nanoflower for Enhanced Electron Transfer and Stability of Hydrogen Peroxide Biosensor”, **Small Sciences Symposium**, Dec 2012, Singapore
12. **P. Si**, et al., “Novel Biomolecule Detection Platform Based on Hierarchical Mn<sub>3</sub>O<sub>4</sub>/3D Graphene Composite”, **International Conference of Young Researchers on Advanced Materials**, July 2012, Singapore
13. **P. Si**, et al., “Novel Biosensing Platform Based on Electrodeposited MnO<sub>2</sub> with Hierarchical Architectures”, **5<sup>th</sup> MRS-S Conference on Advanced Materials**, March 2012, Singapore
14. **P. Si**, et al., “Electrochemically Formed 3D Structure of Polypyrrole/Graphene Nanoplatelets for High Performance Supercapacitors”, **International Conference on Materials for Advanced Technology**, Jun 2011, Singapore
15. **P. Si**, et al. “Third-generation of Glucose Biosensors Based on Nanostructured TiO<sub>2</sub> Platform”, **Biomedical Engineering Society 5<sup>th</sup> Scientific Meeting (BES5SM)**, May 28, 2011, Singapore
16. **P. Si**, et al., “Layer-by-Layer Self-Assembly of Carbon Nanotubes, Gold Nanoparticles, Polyelectrolyte and Glucose Oxidase on Au Electrode for Amperometric Glucose Biosensors”, **2<sup>nd</sup> International Conference on Cellular and Molecular Bioengineering**, Aug 2010, Singapore

### Posters

1. **P. Si**, et al., “Gold Nanobipyramids as Optical Coherence Tomography Contrast Agents for Multiplexed Study of Intra- and Peri-Tumoral Lymph Flows *In Vivo*”, Translational Oncology Program at Stanford Annual Symposium, Oct 2019, Stanford, CA
2. **P. Si**, et al., “Family of Optical Coherence Tomography Contrast Agents for Multiplexed Mapping Tumor and Peritumor Lymphatic Drainage *In Vivo*”, **The Early Detection of Cancer Conference**, Sep 2019, Stanford, CA *Selected as Lightning Talk*
3. E. Yuan, **P. Si**, et al., “Spectral-Demixing of Gold Nanoparticles Enables Wide-Field OCT Imaging of Lymphatic Drainage in Mouse Ear”, **World Molecular Imaging Congress**, Sep 2019, Montreal, Canada

4. **P. Si**, et al., “Gold Nanobipyramids as Optical Coherence Tomography Contrast Agents for Multiplexed Mapping Tumor and Peritumor Lymphatic Drainage *In Vivo*”, *World Molecular Imaging Congress*, Sep 2019, Montreal, Canada
5. **P. Si**, et al., “*In Vivo* Imaging of Lymphatic Vessel Endothelial Hyaluronan Receptors During Inflammation with Optical Coherence Tomography”, *Stanford Imaging Symposium*, Sep 2017, Palo Alto, CA
6. **P. Si**, et al., “Gold Nanoprism Enhanced Optical Coherence Tomography of Melanoma Tumor Angiography and Lymphangiography *In Vivo*”, *Canary Symposium*, May 2017, Woodside, CA
7. O. Liba, E. SoRelle, **P. Si**, et al, “MOZART: High-resolution Optical Molecular Imaging System for Medical and Biological Applications”, *Canary Early Detection Symposium*, May 2015, Stanford, CA
8. **P. Si**, et al., "Improving Access to Medical Devices in Low-Resource Settings Through Local Production and Technology Transfer: WHO 2013 Survey Results", *Second WHO Global Forum on Medical Devices*, Nov 2013, Geneva, Switzerland

### **Invited talks**

1. “Guiding Light at the Nanoscale: Contrast Enhanced Optical Coherence Tomography for Molecular Imaging”, Dec 30, 2019, Zhejiang University, Hangzhou, China
2. “Molecular Imaging at a Cellular Resolution in vivo using Optical Coherence Tomography”, Dec 25, 2019, Fudan University, Shanghai, China
3. “In Vivo Molecular Optical Coherence Tomography Enabled by Micro-and Nano-Particles based Contrast Agents”, May 26, 2017, Changchun Institute of Applied Chemistry, Chinese Academy of Sciences, Changchun, China
4. “In Vivo Molecular Optical Coherence Tomography”, May 13, 2017, Ningbo Institute of Material Technology & Engineering, Chinese Academy of Sciences, China

### **GRANTS**

1. “SCMI-OCT: A New Molecular Imaging Technology for Early Assessment of Cancer Immunotherapy Response” submitted to *NCI Transition Career Development Award (K22)*, 2020
2. “MOZART: A New Technology for Imaging Tumor Heterogeneity In Vivo”, funded by *Stanford Medical School Dean’s Postdoctoral Fellowship*, 2014

### **TEACHING AND MENTORING EXPERIENCE**

#### **Stanford University, School of Medicine, Stanford, CA**

- Mentored undergraduate project: Scattering simulation of gold nanobipyramids using discrete dipole approximation 2018
- Mentored high school student project: Detection of circulating blood cells using optical coherence tomography and gold nanoprisms 2014

#### **Nanyang Technological University, Singapore**

- Mentored undergraduate project: Nanoporous TiO<sub>2</sub> as electrode materials for enhanced glucose biosensing 2013
- Teaching assistant, “Vapor Compression Cycle” (CH 2701) 2012  
Gave weekly lab instructions to ~50 sophomore students and graded assignments
- Teaching assistant, “Friction Loss in Pipes” (BG 702) 2012  
Gave weekly lab instructions to ~30 junior students and graded assignments
- Teaching assistant, “FTIR and NMR” (BG 1802) 2011  
Gave weekly lab instructions to ~30 junior students and graded assignments

## **ACADMIC SERVICE**

### **Guest Editor**

Special issue of *Molecules* ""25th Anniversary of *Molecules*—Recent Advances in Nanochemistry"

### **Conference Session Chair**

World Molecular Imaging Congress 2019 Clinical and Co-clinical Studies in Oncology Session  
Second International Symposium on Molecular Imaging (ISMI 2018) Keynote Session

### **Reviewer of Journal Papers**

ACS sensors, ACS Applied Materials & Interfaces, Analyst, Analytical Methods, Electroanalysis, Journal of Nanomaterials, Journal of Nanoscience and Nanotechnology, Journal of Physical Chemistry, Langmuir, Nanoscale Research Letters, Nano Today, Nanoscale, New Journal of Chemistry, RSC Advances

### **Reviewer of Conference Papers**

World Molecular Imaging Congress 2019 Oncology Session

## **ADDITIONAL TRAINING**

- Stanford Scientific Teaching Summer Institute** 2019  
Stanford Office of Postdoctoral Affairs and the Science Education Partnership and Assessment Laboratory of San Francisco State University
- Scientific Management** 2018  
Stanford Office of Postdoctoral Affairs
- Negotiation and Influence** 2018  
Stanford Office of the Vice Provost for Graduate Education
- Stanford Biosciences Grant Writing Academy Proposal Bootcamp** 2017  
Stanford Office of the Vice Provost for Graduate Education
- Preparing for Faculty Careers** 2017  
Stanford Office of Postdoctoral Affairs

## **PROFESSIONAL AFFILIATIONS**

Member of World Molecular Imaging Society (WMIS)  
Member of the international society for optics and photonics (SPIE)  
Member of Materials Research Society (MRS)

## **OTHER PROFESSIONAL ACTIVITIES**

### **Professional experience**

<i>Medical Device Committee Fellow</i> at Life Science Angels, Palo Alto, CA	2016
<i>Consultant</i> at 5AM Ventures, Menlo Park, CA	2015
<i>Intern</i> at World Health Organization, Geneva, Switzerland	2013

### **Leadership experience**

<i>Council member</i> of Stanford University Postdoctoral Association	2015
<i>Board member</i> of Association of Chinese Students and Scholars at Stanford	2014
<i>UN Coordinator</i> of World Health Organization Intern Board	2013
<i>Founder and President</i> of Nanyang Scholars Toastmasters Club	2013