

CURRICULUM VITAE

Shin-Shem Steven Pei

EDUCATION: Ph.D. in Solid State Physics, State Univ. of NY at Stony Brook, 1977.
BA in Physics, National Taiwan University, Taiwan, China 1970.

PROFESSIONAL EXPERIENCE:

10/94 - present: University of Houston, Houston, TX

10/05 - present: Executive Director, Southwest Public Safety Technology Center

3/05 - present: Deputy Director, Center for Advanced Materials

9/98 - present: Professor of Physics

10/94 - present: Professor of Electrical and Computer Engineering

10/02 - 8/05: Assoc. Dean for Research, Cullen College of Engineering

2/02 - 3/05: Deputy Director, Texas Center for Superconductivity and Advanced Materials

10/94 - 2/02: Associate Director for Research, Space Vacuum Epitaxy Center, A NASA Commercial Space Center

1/78 - 9/94: AT&T Bell Laboratories, Murray Hill, NJ

5/90 - 9/94: Head, Materials and Processing Research Department, R&D of carbon-doped microwave power heterojunction bipolar transistor technology and formation of alliance with GaAs microwave IC foundries in support of the AT&T Wireless Business Unit.

11/86 - 4/90: Head, Heterostructure Materials and IC Department, R&D of high speed and high frequency optoelectronic devices and circuits and transfer of molecular beam epitaxy (MBE) and high electron mobility transistor (HEMT) technology to the DARPA pilot production line at AT&T Microelectronics.

11/84 - 10/86: Supervisor, Heterostructure IC Group, Led the R&D of the GaAs/AlGaAs HEMT technology.

4/83 - 10/84: Member of Technical Staff, High Speed IC Group, R&D of the GaAs/AlGaAs HEMT technology.

1/78 - 3/83: Member of Technical Staff/Post Doctoral Fellow, Josephson Junction Devices Group, R&D of the high speed superconducting IC technology.

9/77 - 12/77: Post Doctoral Fellow, SUNY, Stony Brook, NY

9/74 - 6/76: Lecturer, New York Institute of Technology, Westbury, NY

AWARDS AND HONORS:

- Co-Ph.D. Advisor, Al Farabi University, Almaty, Kazakhstan, 2013-present.
- Visiting Professor, National Tsinghua University, Hsinchu, Taiwan, 2012-present.
- Honorable Visiting Professor, Hainan University, Hainan, China, 2007-2009.
- Outstanding Achievement Award, The Association of American-Chinese Professionals, May 30, 1999.
- Senior Faculty Research Award, College of Engineering, Univ. of Houston, 1999.
- Shell Interdisciplinary Scholar, December 8, 1995.
- AT&T Individual Performance Awards.

Patents and Disclosures

1. "Fabrication of Single-crystalline Graphene Arrays", Qingkai Yu, S. S. Pei, US Patent Number 8,597,738 B2, Dec 3, 2013.
2. "Fabrication of Short and Thin Silicon Cantilever Tips for AFM with SOI Wafers", Qingkai Yu, S. S. Pei, Chengzhi Cai, Chi-Ming Yam, and Quoting Qin, US Patent Number 7,637,960, Dec. 29, 2009.
3. (*"Horizontally aligned growth of silicon carbide nanowires on sapphire"*, Hao Li, Qingkai Yu and S. S. Pei, UH patent disclosure, 2005.)
4. (*"Quality-of-Service (QoS) Supporting Mechanisms for Multimedia Streaming over Wireless Networks"*, Nicolaos B. Karayiannis, Il Mo Jung, and S. S. Pei, UH provisional patent filed, 2005.)
5. (*"Infrared Echelon-type Polarizing Beam Splitter"*, Y. Chen and S. S. Pei, UH patent disclosure, 2000.)
6. "Method for Making Self-Electro-Optical Device and Devices Made Thereby (in situ IR photo-reflectance measurement technique for controlling the growth of Fabry-Perot resonance cavities)", L. A. D'Asaro, S. S. Pei and J. M. Kuo, U. S. Patent Number 5,298,454, Mar. 29, 1994.
7. "Planar FET-SEED Integrated Circuits", L. A. D'Asaro, S. S. Pei, L. M. F. Chirovsky and T. K. Woodward, U. S. Patent Number 5,289,015, Feb. 22, 1994.
8. "Planar Quantum Well Photodetector", S. S. Pei and S. P. Hui, U. S. Patent Number 5,281,542, Jan. 25, 1994.
9. "Planar Buried Quantum Well Photodetector", S. S. Pei and S. P. Hui, U. S. Patent Number 5,223,704, June 29, 1993.
10. "Fabrication of GaAs Integrated Circuits", S. S. Pei, M. P. Iannuzzi, T.-H.-H. Voung, A. C. Beca, A. Lahav, C. L. Reynolds, Jr., and R. H. Burton, U. S. Patent Number 5,041,393, Aug. 20, 1991.
11. "Josephson Junction Fabrication Method", S. S. Pei and T. A. Fulton, U. S. Patent 4,470,190, Sept. 11, 1984.

Refereed Journal Publications

Over 3,500 Citations (without Self-Citations) and an h-index of 35

- 1 S. Y. Xu, S. R. Xing, S. S. Pei, and S. Baldelli, "Sum Frequency Generation Spectroscopy Study of an Ionic Liquid at a Graphene-BaF₂ (111) Interface," *Journal of Physical Chemistry B* 118 (19), 5203-5210 (2014).
- 2 Y. N. Wang, Z. H. Su, W. Wu, S. Nie, X. H. Lu, H. Y. Wang, K. McCarty, S. S. Pei, F. Robles-Hernandez, V. G. Hadjiev, and J. M. Bao, "Four-fold Raman enhancement of 2D band in twisted bilayer graphene: evidence for a doubly degenerate Dirac band and quantum interference," *Nanotechnology* 25 (33) (2014).
- 3 S. R. Xing, W. Wu, Y. A. Wang, J. M. Bao, and S. S. Pei, "Kinetic study of graphene growth: Temperature perspective on growth rate and film thickness by chemical vapor deposition," *Chemical Physics Letters* 580, 62-66 (2013).
- 4 N. Xie, H. Q. Gong, Z. Zhou, X. D. Guo, S. C. Yan, Q. Sun, S. R. Xing, W. Wu, S. S. Pei, J. M. Bao, X. Y. Shan, Y. Guo, and X. H. Lu, "Visualization of a Maze-Like Reconstruction of Graphene on a Copper Surface at the Atomic Scale," *Chinese Phys Lett* 30 (5) (2013).
- 5 W. Wu, D. De, S. C. Chang, Y. N. Wang, H. B. Peng, J. M. Bao, and S. S. Pei, "High mobility and high on/off ratio field-effect transistors based on chemical vapor deposited single-crystal MoS₂ grains," *Applied Physics Letters* 102 (14) (2013).
- 6 Y. N. Wang, Z. H. Su, W. Wu, S. Nie, N. Xie, H. Q. Gong, Y. Guo, J. H. Lee, S. R. Xing, X. X. Lu, H. Y. Wang, X. H. Lu, K. McCarty, S. S. Pei, F. Robles-Hernandez, V. G. Hadjiev, and J. M. Bao, "Resonance Raman spectroscopy of G-line and folded phonons in twisted bilayer graphene with large rotation angles," *Applied Physics Letters* 103 (12) (2013).
- 7 J. M. Bao, S. R. Xing, Y. N. Wang, W. Wu, F. Robles-Hernandez, and S. S. Pei, "Fabrication of large-area twisted bilayer graphene for high-speed ultra-sensitive tunable photodetectors," *Proc Spie* 8725 (2013).
- 8 W. Wu, Q. K. Yu, P. Peng, Z. H. Liu, J. M. Bao, and S. S. Pei, "Control of thickness uniformity and grain size in graphene films for transparent conductive electrodes," *Nanotechnology* 23 (3) (2012).
- 9 S. Nie, W. Wu, S. R. Xing, Q. K. Yu, J. M. Bao, S. S. Pei, and K. F. McCarty, "Growth from below: bilayer graphene on copper by chemical vapor deposition," *New J Phys* 14 (2012).
- 10 Q. K. Yu, L. A. Jauregui, W. Wu, R. Colby, J. F. Tian, Z. H. Su, H. L. Cao, Z. H. Liu, D. Pandey, D. G. Wei, T. F. Chung, P. Peng, N. P. Guisinger, E. A. Stach, J. M. Bao, S. S. Pei, and Y. P. Chen, "Control and characterization of individual grains and grain boundaries in graphene grown by chemical vapour deposition," *Nature Materials* 10 (6), 443-449 (2011).
- 11 X. X. Lu, Q. H. Zhang, W. Wu, Z. H. Liu, S. Pei, Q. K. Yu, and J. M. Bao, "Enhanced Fano-like Phonon Resonance in Heavily Doped Graphene," *Int Conf Infra Milli* (2011).
- 12 S. Baldelli, J. M. Bao, W. Wu, and S. S. Pei, "Sum frequency generation study on the orientation of room-temperature ionic liquid at the graphene-ionic liquid interface," *Chemical Physics Letters* 516 (4-6), 171-173 (2011).
- 13 W. Wu, Q. K. Yu, J. Lian, J. M. Bao, Z. H. Liu, and S. S. Pei, "Tetragonal tungsten oxide nanobelts synthesized by chemical vapor deposition," *Journal of Crystal Growth* 312 (21), 3147-3150 (2010).
- 14 W. Wu, Z. H. Liu, L. A. Jauregui, Q. K. Yu, R. Pillai, H. L. Cao, J. M. Bao, Y. P. Chen,

- and S. S. Pei, "Wafer-scale synthesis of graphene by chemical vapor deposition and its application in hydrogen sensing," *Sensors and Actuators B-Chemical* 150 (1), 296-300 (2010).
- 15 Z. H. Liu, X. X. Lu, P. Peng, W. Wu, S. S. Pei, Q. K. Yu, and J. M. Bao, "Room-temperature Fano resonance tunable by chemical doping in few-layer graphene synthesized by chemical-vapor deposition," *Physical Review B* 82 (15) (2010).
 - 16 V. Lee, C. Park, C. Jaye, D. A. Fischer, Q. K. Yu, W. Wu, Z. H. Liu, S. S. Pei, C. Smith, P. Lysaght, and S. Banerjee, "Substrate Hybridization and Rippling of Graphene Evidenced by Near-Edge X-ray Absorption Fine Structure Spectroscopy," *Journal of Physical Chemistry Letters* 1 (8), 1247-1253 (2010).
 - 17 R. Colby, Q. K. Yu, H. L. Cao, S. S. Pei, E. A. Stach, and Y. P. Chen, "Cross-sectional transmission electron microscopy of thin graphite films grown by chemical vapor deposition," *Diamond and Related Materials* 19 (2-3), 143-146 (2010).
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 - 20 H. L. Cao, Q. K. Yu, R. Colby, D. Pandey, C. S. Park, J. Lian, D. Zemlyanov, I. Childres, V. Drachev, E. A. Stach, M. Hussain, H. Li, S. S. Pei, and Y. P. Chen, "Large-scale graphitic thin films synthesized on Ni and transferred to insulators: Structural and electronic properties," *Journal of Applied Physics* 107 (4) (2010).
 - 21 Q. K. Yu, W. Wu, J. M. Zhang, B. A. Liu, and S. S. Pei, "Aligned tungsten oxide nanowires on tungsten (100) substrates," *Materials Letters* 63 (26), 2267-2269 (2009).
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 - 25 W. Wu, Q. K. Yu, J. M. Zhang, J. Lian, G. Liang, R. C. Ewing, and S. S. Pei, "Horizontally aligned Cu₅Si polycrystalline nanorods on Si," *Applied Physics Letters* 92 (25) (2008).
 - 26 H. Q. Le, P. A. Bellamy, and S. S. S. Pei, "The Houston ship channel physical security - A case study - art. no. 65400T," *P Soc Photo-Opt Ins* 6540, T5400-T5400 (2007).
 - 27 Q. K. Yu, G. T. Qin, H. Li, Z. H. Xia, Y. B. Nian, and S. S. Pei, "Mechanism of horizontally aligned growth of single-wall carbon nanotubes on R-plane sapphire," *Journal of Physical Chemistry B* 110 (45), 22676-22680 (2006).
 - 28 Q. K. Yu, G. T. Qin, C. Darne, C. Z. Cai, W. Wosik, and S. S. Pei, "Fabrication of short and thin silicon cantilevers for AFM with SOI wafers," *Sensors and Actuators a-Physical* 126 (2), 369-374 (2006).
 - 29 P. Peng, Y. M. Mu, and S. S. Pei, "Carrier transport in type-II Mid-IR interband cascade laser," *Conference Digest of the 2006 Joint 31st International Conference on Infrared and Millimeter Waves and 14th International Conference on Terahertz Electronics*, 214-214

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- 30 Z. Q. Zhu, Y. M. Mu, and S. S. Pei, "Loss effect on 2D photonic crystal band structure," *Physics and Simulation of Optoelectronic Devices XIII* 5722, 108-114 (2005).
 - 31 P. Peng, Y. M. Mu, and S. S. Pei, "Self-consistent calculation of band diagram and carrier distribution of type-II interband cascade lasers," *Aip Conf Proc* 772, 1549-1550 (2005).
 - 32 P. Peng, Y. M. Mu, and S. S. Pei, "Numerical calculation of the energy-band diagram of midinfrared quantum cascade semiconductor lasers by self-consistent method," 3rd International Conference on Computing, Communications and Control Technologies, Vol 1, Proceedings, 20-24 (2005).
 - 33 Y. M. Mu and S. S. Pei, "Effects of anisotropic k center dot p interactions on energy bands and optical properties of type-II interband cascade lasers," *Journal of Applied Physics* 96 (4), 1866-1879 (2004).
 - 34 D. P. Xu, A. P. Litvinchuk, X. Wang, A. Delaney, H. Le, and S. S. Pei, "Structure stability of short-period InAs/AlSb superlattices," *Journal of Crystal Growth* 251 (1-4), 547-550 (2003).
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 - 39 G. P. Luo, C. Peng, H. Q. Le, S. S. Pei, H. Lee, W. Y. Hwang, B. Ishaug, and J. Zheng, "Broadly wavelength-tunable external cavity mid-infrared quantum cascade lasers," *Ieee Journal of Quantum Electronics* 38 (5), 486-494 (2002).
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 - 41 G. P. Luo, C. Peng, H. Q. Le, S. S. Pei, W. Y. Hwang, B. Ishaug, J. Um, J. N. Baillargeon, and C. H. Lin, "Grating-tuned external-cavity quantum-cascade semiconductor lasers," *Applied Physics Letters* 78 (19), 2834-2836 (2001).
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 - 44 S. J. Murry, J. Zheng, C. H. Kuo, C. H. Lin, H. Q. Le, and S. S. Pei, "High-power optically pumped type-II QW lasers grown on GaAs compliant substrate," *In-Plane Semiconductor Lasers Iv* 3947, 136-143 (2000).
 - 45 Y. M. Mu, C. H. Lin, and S. S. Pei, "Modeling of mid-IR type-II interband cascade lasers," *Physics and Simulation of Optoelectronic Devices Viii*, Pts 1 and 2 3944, 345-352 (2000).
 - 46 C. H. Lin, W. Y. Hwang, S. V. Zaitsev, J. Um, C. H. Kuo, A. Delaney, J. Zheng, S. J. Murry, A. Liu, H. Q. Le, Y. Mu, and S. S. Pei, "Recent progress of mid-IR type-II

- interband cascade lasers," Mater Res Soc Symp P 607, 35-40 (2000).
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 - 50 C. H. Lin, S. J. Murry, C. H. Kuo, J. Zheng, and S. S. Pei, "Optically pumped InAs/InGaSb type-II quantum-well lasers," In-Plane Semiconductor Lasers Iii 3628, 140-147 (1999).
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 - 52 C. L. Felix, W. W. Bewley, I. Vurgaftman, J. R. Meyer, L. Goldberg, E. H. Aifer, L. J. Olafsen, D. H. Chow, E. Selvig, C. H. Lin, S. J. Murry, D. Zhang, and S. S. Pei, "Midinfrared vertical-cavity surface-emitting laser (vol 71, pg 3483, 1997)," Applied Physics Letters 74 (4), 628-629 (1999).
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- Yang, L. Goldberg, D. Zhang, C. H. Lin, S. S. Pei, and D. H. Chow, "Type II W, interband cascade and vertical-cavity surface-emitting mid-IR lasers," *Iee Proceedings-Optoelectronics* 145 (5), 275-280 (1998).
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