

## YONG SHIN, Ph. D

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Scientist II (Principle Investigator)

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### RESEARCH INTEREST

- Development of Medical Diagnostic Applications and Devices to early detection of Human diseases using Biophotonic Device (Neurological diseases and Cancer, and infectious diseases)
- Development of novel DNA amplification techniques (ISAD; Isothermal Solid phase Amplification/Detection) in field of POC (point-of-care) based clinical applications
- Identification and characterization of DNA Biomarkers (Neurological diseases, Cancer, Infectious)
- Identification of Cells, Proteins or Nucleic acids (Genetic; DNA/RNA, and Epigenetic; miRNAs, DNA methylation) from Human Fluidics (Blood, Urine, CSF and so on)

### EDUCATION

**Max Planck Institute (MPI) of Experimental Medicine and  
Georg-August-University Goettingen, Germany**

**Ph.D., Molecular Neuro-biology**

**Oct. 2008**

Advisor: Prof. Dr. Nils Brose (Department of Molecular Neurobiology)

Dissertation: "Large Dense Core Vesicle in mouse chromaffin cell is regulated by Munc13s and Baiap3"

**Seoul National University (SNU), South Korea**

**M.S., Cancer Biology**

**Feb. 2005**

Advisor: Prof. Dr. Jae Gahb Park (School of Medicine)

Dissertation: "*E-cadherin* promoter polymorphism and its regulated on Cancer"

**Korea University (KU), South Korea**

**B.E., Biotechnology**

**Feb. 2002**

Military Service [Army (26 months); March. 1997- May. 1999]

### RESEARCH CAREER

**Institute of Microelectronics, BioElectronics Group, A\*STAR, Singapore**

**Scientist II (principle investigator)**

**2012-Current**

- Development of Biomarker in Bladder Cancer Using Silicon based Biosensor/Photonics
- Development of PCR (polymerase chain reaction) device for DNA biomarker detection
- Development of Highly sensitive Biosensor using Silicon Microring Resonators

**LG Electronics, Medical Device Group, Advanced Research Institute, South Korea**

**Senior Research Engineer**

**2010-2012**

- Development of Solid Phase PCR using Fluorescence (FRET)
- Development of single nucleotide analysis using Solid State Nanopore

**University of Massachusetts Medical School (UMMS), MA, USA****Post-doctoral Associated Fellow****2009-2010**

- Investigation of transcription factors which related with neurodevelopmental disease
- Generation of REST knockout mice using shRNA lenti virus

**Max Planck Institute of Experimental Medicine (MPIEM), Goettingen, Germany****Pre- and Post-doctoral Research Fellow****2005-2009**

- Investigation of Munc13s protein function in Large Dense Core Vesicle
- Generation of Munc13-1 conditional mice
- Baiap3 function in LDCV using Flash photolysis Caged Ca<sup>2+</sup> techniques

**Seoul National University (SNU), South Korea****Pre-doctoral Researcher****2003-2005**

- Identification of Gene mutation and SNP in Colorectal and Lung Cancers
- Investigation of Gene function in Gastric and Colorectal Cancers
- Identification of Gene mutation and SNP in Breast and Cervical Cancers

**National Cancer Center, South Korea****Researcher****2001-2005**

- Identification of Gene mutation and SNP in Colorectal and Lung Cancers
- Investigation of Gene function in Gastric and Colorectal Cancers
- Identification of Gene mutation and SNP in Breast and Cervical Cancers

**GRANTS (Research Funds)**

10/2014-09/2016  
(Granted)

**BEP (Biomedical Engineering Program) 2014 (Role: PI): \$1.5M for 2 yrs**  
**Title: Point-of-care solution for sensitive and rapid diagnosis of multidrug resistant tuberculosis (MDR-TB)**

**PATENTS**

- 8 "Label-free methods for isolation and Analysis of Nucleic acids on solid phase device" **Shin Y**, Park MK. Filed Nr.: PCT/US13/07646/01, WO2014092653 A1
- 7 "Apparatus and Method for Nanopore" Kim DM, Shim BC, Oh J, Han S, Kim J, and **Shin Y**. Filed Nr.: PCT/US13/626004
- 6 "Apparatus and Method for nucleic acid analysis" Shim BC, Oh J, Kim DM, Kim J, and **Shin Y**. Filed Nr.: PCT/KR2011/008154
- 5 "Apparatus and Method for Nanopore using Oligonucleotides" **Shin Y**, Kim DM, Kim J, and Shim BC. Filed Nr.: PCT/KR2011/008784
- 4 "Method for detecting multiple-target nucleic acid in real time" **Shin Y**, Oh J, Shim BC, Kim DM, and Cho SM. Filed Nr.: 10-2011-0030738 KOREA
- 3 "Device for pretreating biological sample" **Shin Y**, Oh J, Han S, Kim J, Kim DM, and Shim BC. Filed Nr.: 10-2011-0047652 KOREA
- 2 "Apparatus and Method for low concentration of DNA detection using nanopore" **Shin Y**, Oh J, Han S, Kim J, Kim DM, and Shim BC. Filed Nr.: 10-2011-0056484 KOREA
- 1 "Apparatus and Method for Nanopore" Kim DM, Shim BC, Oh J, Han S, Kim J, and **Shin Y**. Filed Nr.: 10-2011-00997 KOREA

## **PUBLICATIONS in SCI (Peer-Reviewed, H-index: 15, Total citation: > 780)**

- 31 “Portable Mach-Zehnder Interferometer (MZI) sensor/diagnostic system for rapid multiplex detection of miRNAd in urine” \*Liu Q, \***Shin Y**, Kee JS, Kim KW, Rafei SRM, Perera AP, Tu X, Lo GQ, Ricci E, Colombel M, Chion E, Thierry JP, Park MK. In Revision. **Biosensors and Bioelectronics (IF: 6.5)**. (\*Co-first Authors)
- 30 “A rapid amplification/detection of *Mycobacterium Tuberculosis* using Isothermal cycling and silicon biophotonic sensor complex” \***Shin Y**, Perera AP, Tang WY, Fu DL, Liu Q, Kee JS, Gu Z, Lee TY, Barkham T, Park MK. **Biosensors and Bioelectronics (IF: 6.5)**. 68, 390-396, 2015. (\*Corresponding Authors)
- 29 “Rapid and label-free amplification and detection assay for genotyping of cancer biomarker” \***Shin Y**, Yoon JY, Perera AP, Han KS, Yoon YJ, Soo RA, Park MK. **Biosensors and Bioelectronics (IF: 6.5)**, 68, 107-114, 2015 (\*First Authors)
- 28 “A simple, low-cost, and rapid device for DNA methylation-specific amplification/detection system using flexible plastic and silicon complex” Lee TY, \***Shin Y**, Park MK. **Lab on a Chip (IF: 5.8)**. 14, 4220-4229. 2014. (\*Corresponding Author)
- 27 “Rapid prototyping of multifunctional microfluidic cartridges for electrochemical biosensing platform” \*Kim J, \***Shin Y**, Song S, Lee J, Kim J. **Sens. Actuators B. (IF: 3.8)** 202, 60-66, 2014 (\*Co-first Authors)
- 26 “A solid phase-bridge based DNA amplification technique with fluorescence signal enhancement for detection of cancer biomarkers” \***Shin Y**, J Kim, TY Lee. **Sens. Actuators B. (IF: 3.8)** 199, 220-225, 2014. (\*Corresponding Author)
- 25 “Solid phase nucleic acid extraction technique in a microfluidic chip using a novel non-chaotropic agent ; Dimethyl Adipimidate” \***Shin Y**, Perera AP, Wong CC, Park MK. **Lab on a Chip, (IF: 5.8)** 14, 359-368, 2014. (\*First Authors)
- 24 “Highly sensitive Mach-Zehnder interferometer biosensor based on silicon nitride slot waveguide.” Liu Q, Tu X, Kim KW, Sheng KJ, **Shin Y**, Han K, Yoon YJ, Lo GQ, Park MK. **Sens. Actuators B. (IF: 3.8)** 188, 681-688, 2013.
- 23 “Genetic markers of a Munc13 protein family member, BAIAP3, are gender-specifically associated with anxiety and benzodiazepine abuse in mouse and man.” Wojcik SM, Tantra M, Stepniak B, Man KM, Ribbe K, Begemann M, Ju A, Papiol S, Ronnenberg A, Gurvich A, **Shin Y**, Augustine I, Brose N, Ehrenreich H. **Molecular Medicine, (IF: 4.5)** 19, 135-148, 2013.
- 22 “Real-time, label-free Isothermal Solid phase Amplification/Detection (ISAD) device for detection of single point mutation in cancers.” \***Shin Y**, Perera AP, Kim KW, Park MK. **Lab on a Chip, (IF: 5.8)** 13, 2106-2114, 2013. (\*First Authors)
- 21 “Label-free, PCR-free chip-based detection of telomerase activity in bladder cancer cells. Kim KW, **Shin Y**, Perera AP, Liu Q, Sheng KJ, Han K, Yoon YJ, Park MK. **Biosensors and Bioelectronics, (IF: 6.4)** 45, 152-157, 2013.
- 20 “Label-free DNA Sensor for Detection of Bladder Cancer Biomarkers in Urine.” \***Shin Y**, Perera AP, Park MK. **Sens. Actuators B. (IF: 3.8)** 178, 200-206, 2013. (\*First Authors)

- 19 “Label-Free Methylation Specific Sensor based on Silicon Microring Resonators for detection and Quantification of DNA Methylation Biomarkers in Bladder Cancer.” \***Shin Y**, Perera AP, Sheng KJ, Song J, Lo GQ, Park MK. **Sens. Actuators B. (IF: 3.8)** 177,404-411, 2013. (\*First Authors)  
**Selected A\*STAR Research Highlight on August 2013**
- 18 “Temporal Control of a Dendritogenesis-Linked Gene via Rest-Dependent Regulation of Nuclear Factor I Occupancy.” Wang W, **Shin Y**, Shi M and Kilpatrick DL. **Mol. Biol. Cell. (IF: 5.4)** 22, 868-879, 2011.
- 17 “Analysis of microsatellite instability in stool DNA of patients with colorectal cancer using denaturing high performance liquid chromatography.” Lim SB, Jeong SY, Kim IJ, Kim DY, Jung KH, Chang HJ, Choi HS, Sohn DK, Kang HC, **Shin Y**, Jang SG, Park JH and Park JG. **World. J. Gastroenterol.** 12(41): 6689-92, 2006.
- 16 “Three novel VHL germline mutations in Korean patients with von Hippel-Lindau disease and pheochromocytomas.” Kang HC, Kim IJ, Park JH, **Shin Y**, Jang SG, An SA, Park HW, Lim SB, Oh SK, Kim DJ, Lee KW, Choi YJ, Park YJ, Lee MR, Kim DW and Park JG. **Oncol Rep.** 14(4); 879-883. 2005.
- 15 “Mutation Spectrum of the APC gene in 83 Korean FAP Families.” Kim DW, Kim IJ, Kang HC, Park HW, **Shin Y**, Park JH, Jang SG, Yoo BC, Lee MR, Hong CW, Park KJ, Oh NG, Kim NK, Sung MK, Lee BW, Kim YJ, Lee HS and Park JG. **Hum Mutation.** 8:26(3); 281. 2005.
- 14 “Familial gastric cancers with Li-Fraumeni syndrome: A case repast.” Kim IJ, Kang HC, **Shin Y**, Yoo BC, Yang HK and Park JG. **World J. Gastroenterol.** 14:11(26); 4124-4126. 2005.
- 13 “Mutational analysis of OGG1, MYH, MTH1 In FAP, HNPCC and sporadic colorectal cancer patients: R154H OGG1 polymorphism is associated with colorectal cancer patients.” Kim IJ, Ku JL, Kang HC, Park JH, Yoon KA, **Shin Y**, Park HW, Jang SG, Lim SK, Han SY, Shin YK, Lee MR, Jeong SY, Shin HR, Lee JS, Kim WH and Park JG. **Hum Genet.** 115: 498-503. 2004.
- 12 “A TP53-truncating germline mutation (E287X) in a family with characteristics of both Hereditary diffuse gastric cancer and Li-Fraumeni syndrome.” Kim IJ, Kang HC, **Shin Y**, Park HW, Jang SG, Han SY, Lim SK, Lee MR, Chang HJ, Ku JL, Yang HK and Park JG. **J Hum Genet.** Sep 10. 2004.
- 11 “A functional polymorphism -347G/GA of E-cadherin gene is associated with colorectal cancer.” \***Shin Y**, Kim IJ, Kang HC, Park JH, Park HW, Jang SG, Lee MR, Chang HJ, Jeong SY, Ku JL and Park JG. **Carcinogenesis.** 25(11): 2173-2176. 2004. (\*First Authors)
- 10 “The E-cadherin -347G/GA promoter polymorphism and its effect on transcriptional regulation.” \***Shin Y**, Kim IJ, Kang HC, Park JH, Park HR, Park HW, Park MA, Lee JS, Yoon KA, Ku JL and Park JG. **Carcinogenesis.** 25(6): 895-899. 2004. (\*First Authors)
- 9 “Oligonucleotide microarray-based mutation detection of the K-ras gene in colorectal cancers using Competitive DNA Hybridization (CDH).” Park JH, Kim IJ, Kang HC, **Shin Y**, Park HW, Jang SG, Ku JL, Lim SB, Jeong SY and Park JG. **Clinical Chemistry.** 50(9): 1688-91. 2004.

- 8 “Promoter hypermethylation and silencing of CHFR mitotic stress checkpoint gene in human gastric cancers.” Kang HC, Kim IJ, Park JH, **Shin Y**, Park HW, Ku JL, Yang HK, Lee KU, Choe KJ and Park JG. **Oncology Reports**. 12: 129-133. 2004.
- 7 “Identification of genes with differentially expressed genes in acquired drug-resistant gastric cancer cells by oligonucleotide microarrays.” Kang HC, Kim IJ, Park JH, **Shin Y**, Jung MS, Yoo BC, Kim HK and Park J G. **Clin. Cancer Res**. 10: 272-284. 2004.
- 6 “Robust microsatellite instability (MSI) analysis by denaturing high-performance liquid chromatography (DHPLC).” Kim IJ, **Shin Y**, Kang HC, Park JH, Ku JL, Park HW, Park HR, Lim SB, Jeong SY, Kim WH and Park JG. **J Hum Genet**. 48: 525-530. 2003.
- 5 “Mutational analysis of BRAF and K-ras in gastric cancers: absence of BRAF mutations in gastric cancers.” Kim IJ, Park JH, Kang HC, **Shin Y**, Park HW, Park HR, Ku JL, Lim SB and Park JG. **Hum Genet**. 114: 118-120. 2003.
- 4 “A novel germline mutation in the MET extracellular domain in a Korean patient with the diffuse type of familial gastric cancer.” Kim IJ, Park JH, Kang HC, **Shin Y**, Lim SB, Ku JL, Yang HK, Lee KU and Park JG. **J Med Genet**. 40:e97. 2003.
- 3 “Development and applications of a  $\beta$ -catenin oligonucleotide microarray:  $\beta$ -catenin mutations are dominantly found in the proximal colon cancers with microsatellite instability.” Kim IJ, Kang HC, Park JH, **Shin Y**, Ku JL, Lim SB, Park SY, Jung SY., Kim HK and Park JG. **Clin. Cancer Res**. 9: 2920-2925. 2003.
- 2 “Germline mutations of the MEN1 gene in Korean families with multiple endocrine neoplasia type 1 (MEN1) or MEN1-related disorders.” Park JH, Kim IJ, Kang HC, Lee SH, **Shin Y**, Kim KH, Lim SB, Kang SB, Lee KU, Kim SY, Lee MS, Lee MK, Park JH, Moon SD and Park JG. **Clin Genet**. 64: 48-53. 2003.
- 1 “Germline mutations of BRCA1 and BRCA2 in Korean breast and/or ovarian cancer families.” Kang HC, Kim IJ, Park JH, Kwon HJ, Won YJ, Heo SC, Lee SY, Kim KH, **Shin Y**, Noh DY, Yang DH, Choe KJ, Lee BH, King SB and Park JG. **Hum Mutat**. 64: 48-53. 2002.

### **CONFERENCE PUBLICATION (Peer-Reviewed)**

- 6 “Integrated silicon microring resonator devices for point-of-care diagnostic applications.” Park MK, Liu Q, Kim KW, **Shin Y**, Kee JS, Song J, Lo GQ, Kwong DL. SPIE Photonics West OPTO. 1-6, February, 2014, 8990-8995.
- 5 “Baiap3 as a genetic marker associated with anxiety and benzodiazepine abuse in mouse and man” Wojcik SM, Tantra M, Stepniak B, Man KM, Muller-Ribbe K, Begemann M, Papiol S, Ronnenberg A, Gurvich A, **Shin Y**, Augustin I, Brose N, Ehrenreich H. Exp. Clin Endocrinol Diabetes 2013; 121-T10.
- 4 “A novel optical multiplexed, label-free bio-photonics-sensor realized on CMOS-compatible optoelectronic integrated circuit (OEIC) platform.” Song J, Luo X, Kee JS, Liu Q, Kim KW, **Shin Y**, Park MK, Ang KW, Lo G. IEEE International Electron Devices Meeting (IEDM). 9-11, December, 2013
- 3 “Baiap3 as a genetic marker associated with anxiety and benzodiazepine abuse in mouse and man” Wojcik SM, Tantra M, Stepniak B, Man KM, Muller-Ribbe K,

Begemann M, Papiol S, Ronnenberg A, Gurvich A, **Shin Y**, Augustin I, Brose N, Ehrenreich H. Exp. Clin Endocrinol Diabetes 2013; 121-T10.

- 2 “Development of multiplexed silicon dual microring sensor for the detection of bladder cancer biomarkers.” Kim KW, Song J, Liu Q, **Shin Y**, Park MK. IEEE\_Photonic Global Conference. 13-16, December, 2012.
- 1 “Detection of Bladder cancer related DNA biomarkers using silicon microring resonators.” \***Shin Y**, Perera AP, Kim KW, Park MK. IEEE\_Photonic Global Conference. 13-16, December, 2012. (\*First Authors)

## **BOOK CHAPTER**

Kim IJ, Kang HC, Park JH, **Shin Y**, Yoo BC and Park JG. Development and application of an oligonucleotide microarray for mutational analysis. Chapter 14, Microarrays methods and applications. Nuts and Bolts. 2003

## **AWARDS & HONOR**

10/2011	Six Sigma Green Belt at LG Electronics, Korea
01/2009-06/2009	Stipend for Postdoctoral Researcher at Max Planck Society, Germany
07/2006-12/2008	Salary for Ph.D Student (TVoD 1/2) at Max Planck Society, Germany
03/2005-06/2006	Scholarship for Ph.D. Student at Max Planck Society, Germany
02/2004	National Cancer Center in Korea Travel Award for 95th AACR
03/2003-02/2005	National Scholarship (BK21) - Seoul National University, Korea

## **PRESENTATIONS**

### **Oral**

01/2015	Graduate School of Cancer Science and Policy, National Cancer Center, Korea
11/2014	Catholic University of Korea, College of Medicine, Korea
10/2014	Kangwon National University, College of Medicine, Korea
10/2014	Korea University, Department of Biotechnology, Korea
11/2013	3 <sup>rd</sup> Asia-Korean Conference on Science and Technology, Singapore
06/2013	Kyung Hee University (Invited), Department of Biotechnology, Korea
05/2011	Seoul National University (Invited), Department of Health, Korea
03/2011	Seoul National University (Invited), Department of Materials, Korea
02/2011	Kyung Hee University (Invited), Department of Food and Biotechnology, Korea
02/2009	Neuroscience Seminar Series (Invited), Brown University, RI, USA,
01/2009	Physiology Seminar Series (Invited), University of Massachusetts Medical School, (UMMS), Worcester, MA, USA,
06/2004	30th Annual Meeting of Korean Cancer Association, Seoul, Korea
05/2004	10th Hereditary Tumor and Genome Research Workshop (Invited), Korea,
09/2003	9th Hereditary Tumor and Genome Research Workshop (Invited), Korea,

### **Poster**

09/2014	A*STAR Scientific Conference 2014, Singapore
09/2014	ICMB 2014, 3 papers presentation, Singapore
11/2013	Lab on a Chip Asia 2013, Singapore
09/2013	ICBBBE Conference 2013, Singapore
12/2012	IEEE_Photonics Global Conference 2012, Singapore

10/2012	A*STAR Scientific Conference 2012, Singapore
05/2009	Neurizons 2009 Wiring the brain: From synapses to ensembles, Germany
03/2009	The Gottingen Meeting of the German Neuroscience Society 2009, Germany
09/2008	CMPB Symposium 2008 From Neurogenesis to Synaptogenesis, Germany
08/2008	EU-Korea Conference on Science and Technology, Heidelberg, Germany
11/2007	SFN (Society for Neuroscience) 2007 Annual Meeting, San Diego, USA
05/2007	Neurizons 2007 Interdisciplinary meeting on the neurosciences, Germany
03/2004	95th AACR (American Association for Cancer Research), USA
06/2003	20th IATMO (International Academy of Tumor Marker Oncology), Italy

## **Certified Training Course**

04/2011	“CMOS (complementary metal-ion semiconductor) Device Fabrication Course” at Inter-university semiconductor research center, Seoul, Korea
11/2010	“Kobic-Bioinformatics Course for Next generation sequencing”, Seoul, Korea
04/2008	“Introductory course in laboratory animals: Handling, Techniques and Theory.” Max Planck Institute of Experimental Medicine, Goettingen, Germany.

## **RESEARCH SKILLS**

### **I) Biology Field**

- I) Animal handling: Knock Out mouse Generation (conditional and conventional),
- II) Protein assays (Antibody generation, Western blot, Immunoprecipitation, Cosedimentation),
- III) RNA assays (Northern blot, RNA isolation, RT-PCR, Microarray),
- IV) DNA assays (PCR, Realtime-PCR, Chromatin IP, Southern blot, Making constructs, SSCP, Sequencing, DHPLC, Methylation specific PCR),
- V) Electrophysiological experiments  
(Flash photolysis of caged NP-EGTA, Capacitance measurement, Ca<sup>2+</sup> Calibration using two-dye)
- VI) Other methods: Promoter Reporter Assay (Luciferase),  
Virus generation (Lenti-, Semliki Forest-, Retro-Viruses), Flow Cytometry and so on.

### **II) Engineering Field**

- I) Silicon based Semi-conductor fabrication (Fabrication Process)
- II) Nanopore fabrication (ex; Electron Beam lithography, Focused Ion Beam, TEM, STEM)
- III) Electrical control for DNA translocation using Patch Clamp Amplifier (SEQUENCER)
- IV) Nucleic Acid Testing Device Fabrication (DETECTION METHOD)
- V) Silicon based Optical biophotonic sensors (Silicon Microring Resonators and MZI)
- VI) DNA amplification methods on solid surface (thermal and isothermal)
- VII) Microfluidic based solid phase technique for bio-molecules detection
- VIII) Flexible thin film fabrication using laser cutting machine

## **REFERENCES**

1. **Prof. Dr. Nils Brose**  
Director at Department of Molecular Neurobiology  
Max Planck Institute for Experimental Medicine (MPIEM), and  
Faculty of Biology at Georg-August-University, Goettingen  
Hermann Rein Str. 3, D-37075 Goettingen, **Germany**  
[brose@em.mpg.de](mailto:brose@em.mpg.de)
2. **Prof. Dr. Daniel L. Kilpatrick**  
Department of Microbiology and Physiological Systems, and Program in Neuroscience,  
Albert Sherman Center/AS8-1055, University of Massachusetts Medical School, 368  
Plantation Street, Worcester, MA 01605-2324, **United States of America (USA)**  
[daniel.kilpatrick@umassmed.edu](mailto:daniel.kilpatrick@umassmed.edu)
3. **Dr. Mi Kyoung Park**  
Head of Department of BioElectronics Group  
Institute of Microelectronics (IME),  
Agency for Science, Technology and Research (A\*STAR)  
11 Science Park Road, Singapore Science Park II, **Singapore**  
[parkmk@ime.a-star.edu.sg](mailto:parkmk@ime.a-star.edu.sg)
4. **Dr. Byong Chul Yoo**  
Department of Colorectal Cancer  
National Cancer Center, Korea  
323 Ilsan-ro, Ilsandong-gu, Goyang-si, Gyeonggi-do, **South Korea**  
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