## FELLOWSHIP APPLICANT BIOGRAPHICAL SKETCH

**USE ONLY FOR INDIVIDUAL PREDOCTORAL and POSTDOCTORAL FELLOWSHIPS. DO NOT EXCEED FOUR PAGES.**

| NAME OF FELLOWSHIP APPLICANT | POSITION TITLE |
|---|---|
| Juyoung Kim | Postdoctoral researcher |
| eRA COMMONS USER NAME (credential, e.g., agency login) | |

*EDUCATION/TRAINING (Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)*

| INSTITUTION AND LOCATION | DEGREE *(if applicable)* | YEAR(s) | FIELD OF STUDY |
|---|---|---|---|
| KAIST (Korea Advanced Institute of Science and Technology) | B.S. | 03/2005 | Physics |
| KAIST (Korea Advanced Institute of Science and Technology) | Ph.D. | 02/2011 | Laser Photonics |
| KAIST (Korea Advanced Institute of Science and Technology) | n/a (postdoc) | 12/2012 | Nano Photonics |
| Stanford University, School of Medicine | n/a (postdoc) | *present* | Neurobiology |

Please refer to the application instructions in order to complete sections A, B, C, and D of the Biographical Sketch.

### A. Personal Statement

My research pursuit is to understand how a complex network of neurons in the brain processes visual information and to figure out what is the general rule for the diverse connections between neurons. I finished my BS and PhD/MS degrees all from Physics. During my PhD, I was able to conduct research with Dr. YH Lee on developing photonic crystal nanolasers and optical resonators that are applicable for a photonic integrated circuit and quantum information processing. I have extensively studied photonic crystal lasers through rigorous numerical simulation, nano-fabrication, and optical characterization using photoluminescence spectroscopy in visible and near infrared range. In recent years, I have realized that my research passion lies on the biological system. It started from the eye and the retina in view of photonics. Then, my attention has, rather quickly, been drawn to the neural circuits of the retina and its remarkable signal processing. Now I am eager to apply advanced optical methods in neuroscience to overcome a current limit of electrophysiology techniques, and eventually to decipher the neural circuits of the brain with help of optical recording of a population of neurons and optical label-free microscopy. The proposed research will provide me to address the questions about what specific neurons among diverse cell-types are participating in a specific visual processing of the retina and how they are connected functionally. My sponsor Dr. SA Baccus has been published renowned papers in this field in major journals. The Baccus lab has recently combined an optical recording method with a multielectrode array recording to simultaneously access a population of interneurons and output ganglion cells in the retina. This proposal includes testing a newly emerging vibrational microscopy, which enables to identify retinal neurons without biochemical or genetic labels, and it will directly promote my expertise in the field of neuroscience.

### B. Positions and Honors

| ACTIVITY/OCCUPATION | BEGINNING DATE (mm/yy) | ENDING DATE (mm/yy) | FIELD | INSTITUTION/COMPANY | SUPERVISOR/ EMPLOYER |
|---|---|---|---|---|---|
| Postdoc | 01/2013 | present | Neuroscience | Stanford University | Stephen A. Baccus |

**Academic and Professional Honors**

BK21 postdoc fellowship, 2011-2012
National Research Scholarship (NRFK), 2009
BK21 young physicists' workshop poster award, 2009
National Graduate Student Scholarship (KOSEF), 2005-2010
Jeong-Su Scholarship, 2002

**C. Publications**

Research papers:

1. Indra Karnadi, Ju-Young Kim*, Byeong-Hyeon Ahn, Hee-Jin Lim, Yong-Hee Lee, “Efficient photon collection from reconfigurable photonic crystal slab resonator operating at short wavelengths,” J. Opt. Soc. Am. B, 29(10) 2669-2674 (2012).
2. Seungwoo Lee, Seongnam Kim, Teun-Teun Kim, Yushin Kim, Muhan Choi, Seung Hoon Lee, Ju-Young Kim, Bumki Min, "Reversibly Stretchable and Tunable Terahertz Metamaterial with Wrinkled Layouts,” Adv. Mater., 24 3491-3497 (2012).
3. Michael Gehl, Ricky Gibson, Joshua Hendrickson, Andrew Homyk, Antti Säynätjoki, Tapani Alasaarela, Lasse Karvonen, Ari Tervonen, Seppo Honkanen, Sander Zandbergen, Benjamin C. Richards, J. D. Olitzky, Axel Scherer, Galina Khitrova, Hyatt M. Gibbs, Ju-Young Kim, and Yong-Hee Lee, "Effect of atomic layer deposition on the quality factor of silicon nanobeam cavities," J. Opt. Soc. Am. B 29, A55-A59 (2012).
4. Sejeong Kim, Byeong-Hyeon Ahn, Ju-Young Kim, Kwang-Yong Jeong, Ki Soo Kim, Yong-Hee Lee, “Nanobeam photonic bandedge lasers” Opt. Express 19 24055 (2011).
5. Myung-Ki Kim, Ju-Young Kim, Ju-Hyung Kang, Byeong-Hyeon Ahn and Yong-Hee Lee, “On-demand Photonic Crystal Resonators,” Laser & Photonics Rev. 5(4), 479-495 (2011).
6. B. C. Richards, J. Hendrickson, J. D. Olitzky, R. Gibson, M. Gehl, K. Kieu, P. Polynkin, G. Khitrova, H. M. Gibbs, U. K. Khankhoje, A. Homyk, A. Scherer, J.-Y. Kim, and Y.-H. Lee, “Progress in growth, fabrication, and characterization of semiconductor photonic crystal nanocavities,” Physica Status Solidi (B), 248(4), 892-896 (2011).
7. B. C. Richards, J. Hendrickson, J. D. Olitzky, R. Gibson, M. Gehl, K. Kieu, U. K. Khankhoje, A. Homyk, A. Scherer, J.-Y. Kim, Y.-H. Lee, G. Khitrova, and H. M. Gibbs, "Characterization of 1D photonic crystal nanobeam cavities using curved microfiber," Opt. Express 18, 20558-20564 (2010).
8. Ju-Young Kim, Myung-Ki Kim, Min-Kyo Seo, Soon-Hong Kwon, Jong-Hwa Shin, and Yong-Hee Lee, "Two-dimensionally relocatable microfiber-coupled photonic crystal resonator," Opt. Express 17, 13009-13016 (2009).
9. Min-Kyo Seo, Ju-Hyung Kang, Myung-Ki Kim, Byeong-Hyeon Ahn, Ju-Young Kim, Kwang-Yong Jeong, Hong-Gyu Park, and Yong-Hee Lee, "Wavelength-scale photonic-crystal laser formed by electron-beam-induced nano-block deposition," Opt. Express 17, 6790-6798 (2009).
10. Min-Kyo Seo, Hong-Gyu Park, Jin-Kyu Yang, Ju-Young Kim, Se-Heon Kim, and Yong-Hee Lee, "Controlled sub-nanometer tuning of photonic crystal resonator by carbonaceous nano-dots," Opt. Express 16, 9829-9837 (2008).
11. Sun-Kyung Kim, Hyun Kyong Cho, Kyung Keun Park, Junho Jang, Jeong Soo Lee, Kyung Wook Park, Youngho Park, Ju-Young Kim, and Yong-Hee Lee, "Angle-tuned, evanescently-decoupled reflector for high-efficiency red light-emitting diode," Opt. Express 16, 6026-6032 (2008).

Abstracts:

1. Ju-Young Kim, Seungwoo Lee, Jae-Hyeon Son, Yong-Hee Lee, Bumki Min, “Silicon-InGaAsP hybrid photonic crystal nanocavity”, iNOW 2012, Berkeley, USA (2012) date: Aug 9
2. Byeong-Hyeon Ahn, Ju-Young Kim, Chang-Min Lee, Hee-Jin Lim, and Yong-Hee Lee, “Photoluminescence Measurement of Quantum Dot Photonic Crystal Cavity with Curved-microfiber,” CLEO 2012, San Jose, USA (2012), JTh2A.38. Date: May 10.
3. Ju-Young Kim, Seung Hoon Lee, Bumki Min, “High-Q photonic crystal nano-cantilever cavity”, ICAMD 2011, jeju, Korea (2011)
4. Myung-Ki Kim, Min-Kyo Seo, Ju-Yong Kim, Ju-Hyung Kang, Yong-Hee Lee, "Microfiber-coupled photonic crystal resonators", (Invited) SPIE Photonics West 2010, USA (2010)
5. Yong-Hee Lee, Myung-Ki Kim, Ju-Young Kim and In-Kag Hwang, "Reconfigrable high-Q photonic crystal resonators", (Invited) IEEE Photonics Society, Spain (2010)
6. Ju-Young Kim, Myung-Ki Kim, Min-Kyo Seo, In-Kag Hwang, and Yong-Hee Lee, “Two-dimensionally Relocatable Microfiber-Coupled Photonic Crystal Resonator”, PECS 8, Sydney, Australia (2009)
7. Ju-Young Kim, Myung-Ki Kim, and Yong-Hee Lee, “Two-dimensionally relocatable microfiber-coupled photonic-crystal resonator”, iNOW 2008, Tokyo, Japan (2008) 08.05
8. Jin-Kyu Yang, Min-Kyo Seo, Se-Heon Kim, Ju-Young Kim, and Yong-Hee Lee, “Plasmon-free vertically-standing nanometal structure”, MOC’07, Takamatsu, Japan (2007)
9. Se-Heon Kim, Min-Kyo Seo, Ju-Young Kim, and Yong-Hee Lee “Effects of a bottom substrate on emission properties of a photonic crystal nanolaser”, IPRM’07, Matsue, Japan (2007)

**D. Scholastic Performance**

| YEAR | SCIENCE COURSE TITLE | GRADE |
|---|---|---|
| | KOREA INSTITUTE OF SCIENCE AND TECHNOLOGY | |
| 2000 | General Chemistry 1 | A+ |
| 2000 | Principles of Biology | A+ |
| 2000 | Advanced Programming | A+ |
| 2001 | Applied Mathematical Analysis | A0 |
| 2001 | Classical Electromagnetism 1 | B0 |
| 2002 | Classical Electromagnetism 2 | A0 |
| 2002 | Mathematical Methods in Physics 1 | A+ |
| 2002 | Mathematical Methods in Physics 2 | A+ |
| 2003 | Cell Biology 1 | A0 |
| 2003 | Discrete mathematics | A+ |
| 2003 | Computational Physics | A- |
| 2003 | Quantum Mechanics 1 | A0 |
| 2003 | Quantum Mechanics 2 | B+ |
| 2003 | Optics 1 | A0 |
| 2004 | Optics 2 | A- |
| 2004 | Radiation Biophysics | A0 |

| YEAR | OTHER COURSE TITLE | GRADE |
|---|---|---|
| | KOREA INSTITUTE OF SCIENCE AND TECHNOLOGY | |
| 2005 | Classical Mechanics | A+ |
| 2005 | Quantum Mechanics 1 | A+ |
| 2005 | Quantum Mechanics 2 | A- |
| 2005 | Applied Physics Lab. 1 | A- |
| 2005 | Applied Physics Lab. 2 | A- |
| 2005 | Statistical Mechanics | A- |
| 2006 | Advanced Wave Optics | A+ |
| 2006 | Optical electronics | A0 |
| 2006 | Optical communication | B+ |