

Kyungtae Kang, Ph.D.

Last Updated: 2015.12.18

Postdoctoral Fellow
 Phone: +1-(617)-999-6834
 kkang@gmwgroup.harvard.edu

Department of Chemistry and Chemical Biology,
 Harvard University
 12 Oxford Street, Cambridge, MA 02138, USA

- | | |
|-----------------------------------|--|
| Education | <p>KAIST, Daejeon, South Korea Feb 2013
 PhD in Chemistry, Advisors: Insung S. Choi and Yoonkey Nam
 Dissertation: “<i>Surface Organic- and Nano-Chemistry Approach to Study on Neuron/Material Interfaces</i>”</p> <p>KAIST, Daejeon, South Korea Aug 2007
 BS in Chemistry, Advisor: Insung S. Choi</p> |
| Research Experience/Skills | <p>Harvard University, Cambridge, MA, USA Mar 2014 – present
 Postdoctoral Fellow, Advisor: George M. Whitesides</p> <ul style="list-style-type: none"> • <i>Protein-Ligand Binding</i>: isothermal titration calorimetry, expression of recombinant protein, site-directed mutagenesis, X-ray crystallography • <i>The Origin of Life</i>: thioester-thiol chemistry, capillary electrophoresis, mass spectroscopy <p>Harvard University, Cambridge, MA, USA Jun 2008 – Jan 2009
 Visiting Scholar, Advisor: Hongkun Park</p> <ul style="list-style-type: none"> • <i>Delivery of Biomolecules into Living Cells</i>: vapor-liquid-solid growth of Si nanowires, patch-clamp analysis, confocal microscopy <p>KAIST, Daejeon, South Korea Sep 2007 – Feb 2014
 Graduate Student & Postdoctoral Fellow, Advisor: Insung S. Choi</p> <ul style="list-style-type: none"> • <i>Developmental Acceleration of Primary Neurons on Nanotopographies</i>: primary culture of rat embryonic neurons, immunostaining, fluorescence microscopy • <i>Formation of Polydopamine Films</i>: synthesis of polydopamine films and functionalizations, electrochemical formation of polydopamine films • <i>Organic Reactions on Self-Assembled Monolayers</i>: synthesis of organothiols, cyclic voltammetry, soft lithography <p>KAIST, Daejeon, South Korea Dec 2006 – Aug 2007
 Undergraduate Research Fellow, Advisor: Insung S. Choi</p> <ul style="list-style-type: none"> • <i>Formation of Titanium Dioxide Films</i>: self-assembled monolayers, surface-initiated polymerization, atomic force microscopy, scanning electron microscopy <p>KAIST, Daejeon, South Korea Dec 2005 – Feb 2006
 Undergraduate Research Fellow, Advisor: Bong Soo Kim</p> <ul style="list-style-type: none"> • <i>Synthesis of Metal Oxide Nanowires</i>: chemical vapor deposition |
| Honors and Awards | <p>KAIST National Scholarship in B.S. course 2003 – 2007</p> <p>KAIST National Scholarship in Ph.D. course 2007 – 2012</p> |

- KAIST Best Ph.D. Thesis Award** 2012
- Lindau Nobel Laureate Meeting Participant** 2013
- Young Scientist Award** 2013
The 24th International Conference on Molecular Electronics & Devices
- Teaching Experiences** **KAIST**, Daejeon, South Korea Mar 2008 – Dec 2008
Teaching Assistant, Introductory Organic Chemistry
- KAIST**, Daejeon, South Korea Mar 2010 – Dec 2010
Teaching Assistant, General Chemical Experimental Laboratory
- Grant Experiences** (1) “Weak Interactions in Drug Design and Function”, NIH R01 (co-wrote, under review)
- Publications** • **KAIST, South Korea (Ph.D.)**
- (1) Yang, S. H.; **Kang, K.**; Choi, I. S. “Biomimetic Approach to the Formation of Titanium Dioxide Thin Films by Using Poly(2-(Dimethylamino)ethyl Methacrylate)” *Chem. Asian J.* **2008**, *3*, 2097-2104.
- (2) **Kang, K.**; Kang, G.; Lee, B. S.; Choi, I. S.; Nam, Y. “Generation of Patterned Neuronal Networks on Cell-Repellant Poly(oligo(ethylene glycol) Methacrylate) Films” *Chem. Asian J.* **2010**, *5*, 1804-1809.
- (3) Cho, W. K.; **Kang, K.**; Kang, G.; Jang, M. J.; Nam, Y.; Choi, I. S. “Pitch-Dependent Acceleration of Neurite Outgrowth on Nanostructured AAO Substrates” *Angew. Chem. Int. Ed.* **2010**, *49*, 10114-10118. Cover Picture.
- (4) **Kang, K.**; Choi, I. S.; Nam, Y. “A Biofunctionalization Scheme for Neural Interfaces Using Polydopamine Polymer” *Biomaterials* **2011**, *32*, 6374-6380.
- (5) **Kang, K.**; Choi, S.-E.; Jang, H. S.; Cho, W. K.; Nam, Y.; Choi, I. S.; Lee, J. S. “In Vitro Developmental Acceleration of Hippocampal Neurons on Nanostructures of Self-Assembled Silica Beads in Filopodium-Size Ranges” *Angew. Chem. Int. Ed.* **2012**, *51*, 2855-2858. Cover Picture.
- (6) Hong, D.*; **Kang, K.***; Hong, S.-P.; Shon, H. K.; Son, J. G.; Lee, T. G.; Choi, I. S. “Electrochemical Release of Amine Molecules from Carbamate-Based, Electroactive Self-Assembled Monolayers” *Langmuir* **2012**, *28*, 2151-2155.
- (7) Kwon, S.; **Kang, K.**; Jeon, A.; Park, J. H.; Choi, I. S.; Lee, H.-S. “Evaporation-Induced Self-Assembly of trans-2-Aminocyclopentanecarboxylic Acid Hexamers” *Tetrahedron* **2012**, *68*, 4368-4373.
- (8) **Kang, K.**; Lee, S.; Kim, R.; Choi, I. S.; Nam, Y. “Electrochemically-Driven, Electrode-Addressable Formation of Functionalized Polydopamine Films for Neural Interfaces” *Angew. Chem. Int. Ed.* **2012**, *51*, 13101-13104.
- (9) Hong, D.; Bae, K.; Yoo, S.; **Kang, K.**; Jang, B.; Kim, J.; Kim, S.; Jeon, S.; Nam, Y.; Kim, Y.-G.; Choi, I. S. “Generation of Cellular Micropatterns on a Single-Layered Graphene Film” *Macromol. Biosci.* **2014**, *14*, 314-319.

- (10) **Kang, K.**; Kim, M.-H.; Park, M.; Choi, I. S. “Neurons on Nanotopographies: Behavioral Responses and Biological Implications” *J. Nanosci. Nanotechnol.* **2014**, *14*, 531-521. *Invited Review*.
- (11) Kim, M.-H.; Park, M.; **Kang, K.**; Choi, I. S. “Neurons on Nanometric Topographies: Insights into Neuronal Behaviors In Vitro” *Biomater. Sci.* **2014**, *2*, 148-155. *Invited Review*.
- (12) **Kang, K.**; Yoon, S. Y.; Choi, S.-E.; Kim, M.-H.; Park, M.; Nam, Y.; Lee, J. S.; Choi, I. S. “Cytoskeletal Actin Dynamics Involved in Pitch-Dependent Neurite Outgrowth on Bead Monolayers” *Angew. Chem. Int. Ed.* **2014**, *53*, 6075-6079. *Cover Picture*.
- (13) **Kang, K.**; Joo, S.; Choi, J. Y.; Geum, S.; Hong, S.-P.; Lee, S.-Y.; Kim, Y. H.; Kim, S.-M.; Yoon, M.-H.; Nam, Y.; Lee, K.-B.; Lee, H.-Y.; Choi, I. S. “Tissue-Based Metabolic Labeling of Polysialic Acids in Living Primary Hippocampal Neurons” *Proc. Natl. Acad. Sci. USA* **2015**, *112*, E241-E248.
- (14) Joo, S.; **Kang, K.**; Nam, Y. “In Vitro Neurite Guidance Effects Induced by Polylysine Pin-Stripe Micropatterns with Polylysine Background” *J. Biomed. Mater. Res. A* **2015**, *103*, 2731-2739.
- (15) Kwon, S.; Kim, B. J.; Lim, H.-K.; **Kang, K.**; Yoo, S. H.; Gong, J.; Yoon, E.; Lee, J.; Choi, I. S.; Gellman, S. H.; Kim, H.; Lee, H.-S. “Magnetotactic Molecular Architectures from Self-Assembly of β -Peptide Foldamers” *Nat. Commun.* **2015**, *6*, 8748.
- (16) **Kang, K.**; Park, Y.-S.; Jang, M. J.; Kim, S.-M.; Park, M.; Lee, J.; Choi, J. Y.; Jung, D. H.; Yoon, M.-H.; Lee, J. S.; Nam, Y.; Choi, I. S. “Axon-First Neuritogenesis on Vertical Nanowires” *Nano Lett.*, *in press*.

• **Harvard University, USA (Postdoctoral Research)**

- (1) Fox, J. M.; **Kang, K.**; Sherman, W.; Héroux, A.; Sastry, M.; Baghbanzadeh, M.; Lockett, M. R.; Whitesides, G. M. “Interactions between Hofmeister Anions and the Binding Pocket of a Protein” *J. Am. Chem. Soc.* **2015**, *137*, 3859-3866.
- (2) **Kang, K.**; Choi, J.-M.; Fox, J. M.; Lockett, M. R.; Snyder, P. W.; Moustakas, D. T.; Shaw, B. F.; Butte, M. J.; Whitesides, G. M. “Acetylation of Surface Lysine Groups of a Protein Alters the Organization and Composition of Its Crystal Contacts”, *submitted*.
- (3) **Kang, K.**; Fox, J. M.; Choi, J.-M.; Chéron, N.; Baghbanzadeh, M.; Héroux, A.; Shakhnovich, E. I.; Whitesides, G. M. “The Morphology of Hydrophobic Ligands Determines the Magnitude of Enthalpy/Entropy Compensation in Protein-Ligand Binding, but not Binding Affinity”, *in preparation*.
- (4) **Kang, K.**; Fox, J. M.; Whitesides, G. M. “Water, the Hydrophobic Effect, and Biomolecular Recognition”, *in preparation*.

Patents

- (1) “Method of electrochemical coating for polydopamine, and polydopamine coated neural electrode” Korea Patent Application 10-2011-0047325 (May 19, 2011).

- References**
- George M. Whitesides** Postdoctoral advisor
Department of Chemistry and Chemical Biology, Harvard University
mlegrand@gmwgroup.harvard.edu
+1-617-495-9430
- Insung S. Choi** Ph.D. advisor
Department of Chemistry, KAIST
ichoi@kaist.ac.kr
+82-42-350-2840
- Yoonkey Nam** Ph.D. co-advisor
Department of Bio and Brain Engineering, KAIST
ynam@kaist.ac.kr
+82-42-350-4322
- Hongkun Park** Exchange research advisor
Department of Chemistry and Chemical Biology, Harvard University
Hongkun_Park@harvard.edu
+1-617-496-7123