

Hakho Lee, PhD

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Center for Systems Biology
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Research Interests

- Developing novel diagnostic platform based on nanomaterials and microelectronics
 - Synthesis and characterization of magnetic and metallic nanoparticles
 - Implementation of highly sensitive magnetic, electric and optical biosensors
 - Integration of microfluidic systems with microelectronic devices
 - Medical application of sensors for point-of-care applications

Education

09/1998 – 06/2005	PhD Physics, Harvard University, Cambridge, Massachusetts
03/1992 – 02/1998	BS Physics, Seoul National University, Republic of Korea

Professional Experience

10/2010 – present	Assistant Professor, Center for Systems Biology Massachusetts General Hospital, Harvard Medical School
08/2008 – 09/2010	Instructor, Center for Systems Biology Massachusetts General Hospital, Harvard Medical School
08/2005 – 07/2008	Postdoctoral Research Fellow, Advisor: Prof. Ralph Weissleder, Massachusetts General Hospital, Harvard Medical School
06/2000 – 06/2005	Research Assistant, Advisor: Prof. Robert M. Westervelt, Harvard University
09/1998 – 05/2000	Research Assistant, Advisor: Prof. Venkatesh Narayanamurti, Harvard University

Teaching Experience

06/2002 – 12/2002	REU (Research Experiences for Undergraduates) supervisor, Harvard University
09/2000 – 01/2001	Teaching Fellow: Advanced electromagnetism course, Harvard University
09/1998 – 01/1999	Teaching Fellow: Introductory physics course, Harvard university

Honors and Awards

1999	Edward Russell Scholarship, Harvard University
1998	Grand prize in the National Undergraduate Thesis Competition, Ministry of Education, Republic of Korea
1998	Graduated with High Honor in Physics and High Distinction in General Scholarship, Seoul National University, Republic of Korea
1992	First place in the nationwide college entrance exam, Republic of Korea

Selected Publications (*co-first, #co-corresponding)

1. Chung, H. J., Castro, C. M., Im, H., Lee, H.# & Weissleder, R.# A magneto-DNA nanoparticle system for rapid detection and phenotyping of bacteria. *Nat Nanotechnol* **8**, 369-375 (2013).
2. Liong, M., Hoang, A. N., Chung, J., Gural, N., Ford, C. B., Min, C., Shah, R. R., Ahmad, R., Fernandez-Suarez, M., Fortune, S. M., Toner, M., Lee, H.# & Weissleder, R.# Magnetic barcode assay for genetic detection of pathogens. *Nat Commun* **4**, 1752 (2013).
3. Issadore, D., Chung, H. J., Chung, J., Budin, G., Weissleder, R. & Lee, H. μ Hall Chip for Sensitive Detection of Bacteria. *Adv Healthc Mater* **in press** (2013).
4. Shao, H., Chung, J., Balaj, L., Charest, A., Bigner, D. D., Carter, B. S., Hochberg, F. H., Breakefield, X. O., Weissleder, R.# & Lee, H.# Protein typing of circulating microvesicles allows real-time monitoring of glioblastoma therapy. *Nat Med* **18**, 1835-1840 (2012).
5. Issadore, D., Chung, J., Shao, H., Liong, M., Ghazani, A. A., Castro, C. M., Weissleder, R.# & Lee, H.# Ultrasensitive Clinical Enumeration of Rare Cells ex Vivo Using a Micro-Hall Detector. *Sci Transl Med* **4**, 141ra92 (2012).
6. Chung, J., Shao, H., Reiner, T., Issadore, D., Weissleder, R. & Lee, H. Microfluidic Cell Sorter (μ FCS) for On-chip Capture and Analysis of Single Cells. *Adv Healthc Mater* **1**, 432-436 (2012).
7. Agasti, S. S., Liong, M., Tassa, C., Chung, H. J., Shaw, S. Y., Lee, H.# & Weissleder, R.# Supramolecular host-guest interaction for labeling and detection of cellular biomarkers. *Angew Chem Int Ed Engl* **51**, 450-454 (2012).
8. Min, C., Shao, H., Liong, M., Yoon, T. J., Weissleder, R. & Lee, H. Mechanism of Magnetic Relaxation Switching Sensing. *ACS Nano* **6**, 6821-6828 (2012).
9. Yoon, T. J.*, Lee, H.##, Shao, H., Hilderbrand, S. A. & Weissleder, R.# Multicore assemblies potentiate magnetic properties of biomagnetic nanoparticles. *Adv Mater* **23**, 4793-4797 (2011).
10. Chung, H., Reiner, T., Budin, G., Min, C., Liong, M., Issadore, D., Lee, H.# & Weissleder, R.# Ubiquitous detection of gram-positive bacteria with bioorthogonal magnetofluorescent nanoparticles. *ACS Nano* **5**, 8834-8841 (2011).
11. Liong, M., Tassa, C., Shaw, S. Y., Lee, H.# & Weissleder, R.# Multiplexed magnetic labeling amplification using oligonucleotide hybridization. *Adv Mater* **23**, H254-7 (2011).
12. Yoon, T. J.*, Lee, H.##, Shao, H. & Weissleder, R.# Highly magnetic core-shell nanoparticles with a unique magnetization mechanism. *Angew Chem Int Ed Engl* **50**, 4663-4666 (2011).
13. Issadore, D., Shao, H., Chung, J., Newton, A., Pittet, M., Weissleder, R. & Lee, H. Self-assembled magnetic filter for highly efficient immunomagnetic separation. *Lab Chip* **11**, 147-151 (2011).
14. Haun, J. B., Castro, C. M., Wang, R., Peterson, V. M., Marinelli, B. S., Lee, H. & Weissleder, R. Micro-NMR for rapid molecular analysis of human tumor samples. *Sci Transl Med* **3**, 71ra16 (2011).
15. Haun, J. B., Devaraj, N. K., Hilderbrand, S. A., Lee, H. & Weissleder, R. Bioorthogonal chemistry amplifies nanoparticle binding and enhances the sensitivity of cell detection. *Nat Nanotechnol* **5**, 660-665 (2010).
16. Liong, M., Shao, H., Haun, J. B., Lee, H.# & Weissleder, R.# Carboxymethylated polyvinyl alcohol stabilizes doped ferrofluids for biological applications. *Adv Mater* **22**, 5168-5172 (2010).
17. Lee, H.*, Yoon, T. J.*, Figueiredo, J. L., Swirski, F. K. & Weissleder, R. Rapid detection and profiling of cancer cells in fine-needle aspirates. *Proc Natl Acad Sci U S A* **106**, 12459-12464 (2009).
18. Lee, H.*, Yoon, T. J.* & Weissleder, R. Ultrasensitive detection of bacteria using core-shell nanoparticles and an nmr-filter system. *Angew Chem Int Ed Engl* **48**, 5657-5660 (2009).
19. Lee, H., Sun, E., Ham, D. & Weissleder, R. Chip-NMR biosensor for detection and molecular analysis of cells. *Nat Med* **14**, 869-874 (2008).
20. Lee, H., Liu, Y., Ham, D. & Westervelt, R. M. Integrated cell manipulation system--CMOS/microfluidic hybrid. *Lab Chip* **7**, 331-337 (2007).