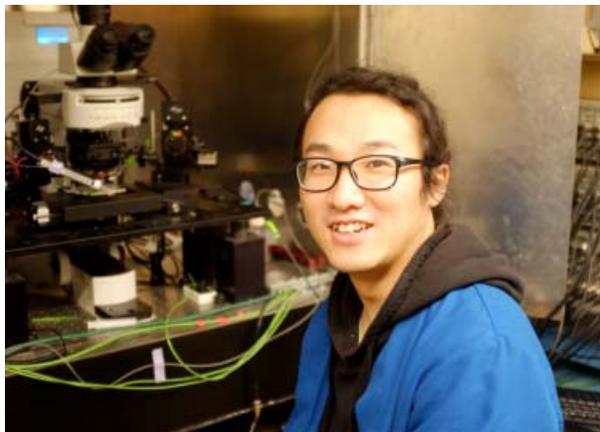

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TECHNOLOGY UPDATE

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Nanotechnology announces the first winner of the Young Researcher Award

When *Nanotechnology* invited nominations for its first ever Young Researcher Award, the wealth of talent and achievements highlighted among early career researchers was striking. Jae Hyun Lee at Harvard Department of Chemistry & Chemical Biology successfully stood out among this elite crop of promising young scientists. We spoke to him about the achievements, challenges and motivations in his career so far and what is grabbing his interest for future work.



Jae Hyun Lee in the Lab (<http://images.iop.org/objects/ntw/news/15/2/12/photo1.png>)

“In 2003 there was a huge boon in nanoparticle chemistry,” says Lee. “Quantum dots were highly praised – such as cadmium sulphide and tellurium selenide and so on. But at the same time my advisor and I saw opportunities for other types of nanoparticles, that is magnetic nanoparticles.”

The differences in magnetic behaviour between bulk and nanostructured materials have fascinated Lee throughout his career, first looking at [MRI contrast agents](http://www.nature.com/nm/journal/v13/n1/abs/nm1467.html) (<http://www.nature.com/nm/journal/v13/n1/abs/nm1467.html>), and then [theranostic nanoparticles](http://www.nature.com/nnano/journal/v6/n7/abs/nnano.2011.95.html) (<http://www.nature.com/nnano/journal/v6/n7/abs/nnano.2011.95.html>). More recently he has [applied magnetic nanostructures to investigations of ear hair cells](http://pubs.acs.org/doi/abs/10.1021/nn5020616) (<http://pubs.acs.org/doi/abs/10.1021/nn5020616>) and nanoswitches. He and his colleagues have also shown that once functionalised with a non-pathogenic protein extracted from HIV a nanowire can penetrate an ear hair cell with minimal damage, providing an intriguing vantage point for measuring the mechanical properties and protein-protein interactions in the cell.

Since moving to Harvard in the group of Charles Lieber, his work has also focused on silicon nanowires and electronics. In his brief career so far, Lee has published several papers that have attracted more than 4000 citations in work by his peers.

Inspiration and challenges

Lee has had fortunate encounters with keen scientists throughout his upbringing. His interest in science first emerged as a school child, when he was encouraged by his father, a science teacher. An excellent chemistry teacher at school further fostered his interest in science and prompted him to opt for a major in Chemistry at college. “The best luck of my life was with my advisor at Yonsei University Jinwoo Cheon,” says Lee. “He is really enthusiastic about science.”

Lee describes how his work on nanoparticles for MRI and cancer theranostics required a deep understanding of magnetism, biology and medicine as well as inorganic chemistry. “It took three to four years to understand magnetism, but at the same time I needed to know biosystems such as protein-protein interactions – the terminology is very different.”

His move to Harvard to work with Lieber now requires also rapidly assimilating the knowledge and understanding at the vanguard of nanoelectronics research. Despite the difficulties associated with changing research focus Lee enjoys learning

new fields, and tells *nanotechweb.org* that in fact changing subjects has not been the hardest thing in his research career so far.

“Current research is all about collaboration,” he says. “The most difficult and important part is relationships with other colleagues - a huge effort goes into building good relationships.”



Jae Hyun Lee with the award (<http://images.iop.org/objects/ntw/news/15/2/12/photo2.jpg>)

Standing out in a talented field

The Editorial Board at *Nanotechnology* were particularly excited about the award. “This award recognizes the very best young researchers in the field of nanotechnology today, and there was an incredibly diverse and talented pool of nominees for the award,” says [Karl Berggren](http://www.rle.mit.edu/qnn/) (<http://www.rle.mit.edu/qnn/>), Professor at MIT’s Quantum Nanostructures and Nanofabrication Group in the US, and member of the Editorial Board for *Nanotechnology* (<http://iopscience.iop.org/0957-4484>). “The scientific and engineering advances in the field today are being made at a blistering pace, and to stand out among this impressive field of candidates is truly remarkable.”

Also highly commended are the runners up for the prize, which include (in alphabetical order) Sukang Bae at the Korea Institute of Science and Technology (KIST); Scott Kevin Cushing at West Virginia University; Renren Deng at National University of Singapore; Jarvist Moore Frost at the University of Bath; Mengdi Han at the Institute of Microelectronics, Peking University; Alireza Kargar at the Department of Electrical and Computer Engineering, University of California-San Diego; Weiyang Li at Stanford University; Datao Tu at Fujian Institute of Research on the Structure of Matter, Chinese Academy of Sciences; and Chuan Wang at the Department of Electrical and Computer Engineering, Michigan State University.

“I am pleased that the *Nanotechnology* Board created this award to recognize the high impact work in our field by researchers who are just embarking on their careers,” says [Meyya Meyyappan](http://www.nasa.gov/centers/ames/research/2009/Meyya_Meyyappan.html) (http://www.nasa.gov/centers/ames/research/2009/Meyya_Meyyappan.html), Chief Scientist at NASA Ames Research Center and Section Editor for Electronics and Photonics in *Nanotechnology* (<http://iopscience.iop.org/0957-4484>), as well as Editor-in-Chief of IOP Publishing’s *Materials Research Express* (<http://iopscience.iop.org/2053-1591>). “The ten finalists, we believe, will be pillars of the future nanotechnology community. Recognition by prestigious journals like ours will, no doubt, boost their standing among their peers.”

Mark Reed (<http://www.eng.yale.edu/reedlab/>), professor at Yale University in the US, and Editor-in-Chief for *Nanotechnology* (<http://iopscience.iop.org/0957-4484>) added, "The sheer power of Lee's work and engineering is very impressive."

Nanotechnology will be presenting the Young Researcher Award annually. To make your nomination for the 2016 Young Researcher Award visit *Nanotechnology* (<http://iopscience.iop.org/0957-4484/page/young-researcher-award>).

About the author

Anna Demming is editor of *nanotechweb.org*

Further reading

Gemcitabine allies with thermal cancer therapy (Feb 2016) (<http://nanotechweb.org/cws/article/tech/63920>)

Making nanowires enter neurons more easily (Jan 2016) (<http://nanotechweb.org/cws/article/tech/63739>)

Nanoparticles tackle cancer with heat and 'suicide genes' (Aug 2014) (<http://nanotechweb.org/cws/article/tech/58224>)