

# Hyekyung Lee, Ph.D.

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## EDUCATION

- Ph.D.**      **Seoul National University, Republic of Korea**      Sep. 2015-Feb. 2020  
Electrical Engineering  
Advisor: Prof. Sung Jae Kim  
Dissertation: Effects of Geometric Modulation on  
Permselective Ion Transport in Microchannels
- M.S.**      **Seoul National University, Republic of Korea**      Sep. 2012-Feb. 2015  
Chemical Engineering  
Advisor: Prof. Kyung Hyun Ahn  
Thesis: Flow Correction to Weak Flow in Particle  
Tracking Microrheology
- B.S.**      **Pusan National University, Republic of Korea**      March 2007-Feb. 2012  
Applied Chemical Engineering

## RESEARCH EXPERIENCE

**Korea Institute of Science and Technology**      Seoul, Republic of Korea  
Postdoctoral fellow      September 2020-June 2021

- Visualized and analyzed particle by size using Hydrodynamic filtration
- Microfluidic chip fabrication for particle sorting according to inlet viscosity ratio

**Seoul National University, School of Dentistry**      Seoul, Republic of Korea  
Postdoctoral fellow      May 2020-August 2020

- Visualized and analyzed particle by size using Nanoparticle Tracking Analysis
- Microfluidic chip fabrication for particle/stem cell sorting

**Stanford University, Department of Mechanical Engineering**      Stanford, CA  
Visiting scholar; Advisor: Prof. Ali Mani      January 2018- March 2019

- Channel design and fabrication to mimic natural non-uniform microstructures
- Visualized electrokinetic flow in microchannel and found a new driving mechanism of overlimiting current

## RESEARCH INTERESTS

Micro/nanofluidics	Lab-on-a-chip	Electrokinetics
Preconcentration and separation	BioMEMS	Fluid Mechanics

## RESEARCH GRANTS

National Research Foundation of Korea

September 2020-August 2021

"Highly efficient size-dependent sorting of cell and particles by non-Newtonian microfluidic filtration,"  
PI, KRW 45,000,000 (~USD 40,000)

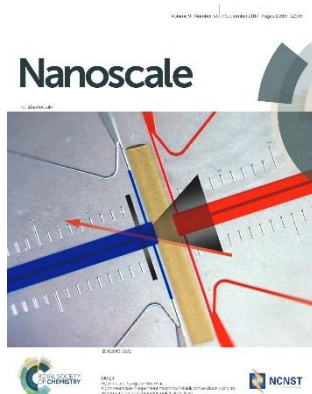
## PUBLICATIONS

- **Hyekyung Lee**, kyu Yoon, Hyun Wook Jung and Myung-Suk Chun, "Effects of two-phase flow in microfluidic-chip filtration for particle sorting," submitted.
- **Hyekyung Lee**, Shima Alizadeh, Tae Jin Kim, Seung-min Park, Tom Soh, Ali Mani and Sung Jae Kim, "Overlimiting Current in Non-uniform Arrays of Microchannels: Recirculating flow and anti-crystallization," *Nano Lett.* 21, 2021, pp5438–5446. **Selected as a cover article.**

Public attention from [SNU ENG](#), [SNU ECE](#), [DongA Science](#), [Seoul Economics Daily](#), [etnews](#), [Herd economic](#), [Newswire](#).



- **Hyekyung Lee**, Junsuk Kim, Hyeonsoo Kim, Ho-Young Kim, Hyomin Lee, and Sung Jae Kim, "A Concentration Independent Micro/Nanofluidic Active Diode using an Asymmetric Ion Concentration Polarization Layer," *Nanoscale*, 9, 2017, pp11871-11880. **Selected as a cover article.**



- Kihong Kim\*, Wonseok Kim\*, **Hyekyung Lee** and Sung Jae Kim, "Stabilization of Ion Concentration Polarization Layer using Micro Fin Structure for High-throughput Applications," *Nanoscale*, 9, 2017, pp3466-3475 \*: These authors contributed equally.

## PRESENTATIONS

- **Hyekyung Lee**, Ali Mani and Sung Jae Kim, "Application of Nonlinear Electrokinetic Transport using Network Heterogeneity of Porous Media," APSDFD Conference 2019, Seattle, USA, Nov.23, 2019. (Oral presentation)
- **Hyekyung Lee**, Shima Alizadeh, Tae Jin Kim, Seung-min Park, Tom Soh, Ali Mani and Sung Jae Kim, "Enhancing overlimiting conductance by non-uniform microconstrictions," KMEMS 2019, Jeju, Apr. 4, 2019. (Oral presentation)
- **Hyekyung Lee**, Shima Alizadeh, Tae Jin Kim, Seung-min Park, Tom Soh, Ali Mani and Sung Jae Kim, "Overlimiting current in non-uniform arrays of microchannels," APSDFD Conference 2018, Atlanta, USA, Nov.18, 2018. (Oral presentation)
- **Hyekyung Lee**, Junsuk Kim, Hyeonsoo Kim, Ho-Young Kim, Hyomin Lee, and Sung Jae Kim, "Concentration Independent Nanoelectrokinetic Active Diode," Gordon Research Conference, Physics and Chemistry of Microfluidics, Lucca, Italy, Jun. 5, 2017. (Poster)
- **Hyekyung Lee**, Junsuk Kim, Hyeonsoo Kim, Ho-Young Kim, Hyomin Lee, and Sung Jae Kim, "Concentration Independent Micro/Nanofluidic Active Diode using Asymmetric Ion Concentration Polarization Layer," KMEMS 2017, Jeju, Mar. 31, 2017. (Poster)
- **Hyekyung Lee\***, Hyomin Lee\*, Junsuk Kim, Hyeonsoo Kim, Ho-Young Kim, and Sung Jae Kim, "Concentration Independent Micro/nanofluidic Diode using Asymmetric Ion Concentration Polarization Layer," 90th ACS Colloid and Surface Science Symposium 2016, Boston, Jun. 7, 2016. \*: These authors contributed equally. (Oral presentation)
- **Hyekyung Lee\***, Junsuk Kim\*, Hyomin Lee\*, Ho-Young Kim and Sung Jae Kim, "Concentration Independent Ionic Current Rectification using Microscale Asymmetry of Ion Concentration Polarization Layer Induced by Residual Electrokinetic Flow," KMEMS 2016, Jeju, Apr. 9, 2016. \*: These authors contributed equally. (Poster)

## PATENTS

- Active Fluidic Diode Using Asymmetric Ion Concentration Polarization Layer, No. 10-1871887-0000 on Jun. 21, 2018, Korea