BIOGRAPHICAL SKETCH

NAME	POSITION TITLE
Jeon, Noo Li	Professor of Mechanical Engineering Seoul National University
eRA COMMONS USER NAME (credential, e.g., agency login)	

EDUCATION/TRAINING

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	MM/YY	FIELD OF STUDY
Northwestern University, IL	B.S.	06/91	Materials Science and Engineering
University of Illinois, Urbana-Champaign, IL	Ph.D.	01/97	Materials Science and Engineering
Harvard University, MA	Postdoctoral	01/00	Chemistry
Harvard Medical School/ Mass General Hospital, MA	Postdoctoral	02/01	Biomedical Engineering

A. Personal Statement

I have been trained at the interface of Engineering and Biology and performing interdisciplinary research. Main goal of my research has been developing novel tools for biomedical research by using engineering approaches that take advantage of the ability to precisely control spatial and temporal cellular microenvironments. My group has pioneered the use of microfluidic devices for cell culture, cell migration and differentiation under gradients (stem cells, neurons, immune cells and cancer cells). I developed the first microfluidic neuron culture chamber that has been commercialized by Xona Microfluidics and now distributed by Millipore as 'AXIS Axon Isolation Device'. We have pioneered the engineering of perfusable blood and lymphatic vessel networks in microfluidic chips and now applying them organ on a chip applications that range from vascularized skin, eye-on-a-chip, BBB, and vascularized tumor. At present, our focus is in developing microfluidic-based injection molded devices (plates with SBS industry format) using polystyrene, so that experiments can be performed in higher-throughput and be used by wider biological community instead of being a niche application among biomedical engineers.

During my postdoc at Harvard with Prof George Whitesides and Prof Mehmet Toner, together with Dr. Dertinger, invented the first microfluidic "gradient generator" and used it for studying chemotaxis of neutrophils and axon guidance.

Before moving to Korea 10 years ago (I am a professor of Mechanical Engineering at Seoul National University, Korea), I was a tenured Associate Professor at the Department of Biomedical Engineering at UC Irvine. At UC Irvine, my group pioneered the first microfluidic device that culture neurons in compartmental chambers while culturing stem cells inside microfluidic devices and applying growth factor gradients and imaging cell proliferation or differentiation.

I have a long track record of research in microfluidics and organ on a chip. Since my pioneering work on "Gradient Microfluidic" devices in 2001, we have focused on cell culture (stem cells) and cell migration (immune cells and stem cells) and lately on 3D co-culture based organ on a chip. Recently, our group has pioneered microfluidic platforms for formation of in-vitro perfusable blood and lymphatic vessel networks. We have been working on integrating vascularized scaffold with skin on a chip for last 4 years and have generated preliminary data on performing skin irritation test on the integrated vascularized skin platform. These first

generation devices were built on PDMS (elastic polymer fabricated soft lithography). At present, our focus is in developing microfluidic-based injection molded devices (plates with SBS industry format) using polystyrene, so that experiments can be performed in higher-throughput and be used by wider biological community instead of being a niche application among biomedical engineers.

I have been collaborating with biologists during my entire scientific career. As my area of research require close collaboration across multiple disciplines such as developing the first microfluidic neuron culture device in 2005 in close collaboration with a neuroscientist (Prof. Carl Cotman). This device is commercially available since 2008 from Millipore and Xona Microfluidics. This new project on skin on a chip with immune component will be another exciting collaboration.

B. Positions and Honors

Positions and Employment

2001-2007	Assistant Professor, Department of Biomedical Engineering, University of California Irvine
2007–2009	Associate Professor, Department of Biomedical Engineering, University of California, Irvine
2009–2012	Associate Professor, School of Mechanical and Aerospace Engineering, Seoul National University, Korea
2012–present	Professor, School of Mechanical and Aerospace Engineering, Seoul National University

C. Contributions to Science (Selected from ~150 peer-reviewed publications)

I. Gradient microfluidic devices and their application in cell migration, differentiation and metastasis.
Gradients play an important role in many physiological and pathological processes. My group has pioneered the use of microfluidic gradient devices.

II. Neuron and stem cell culture device.
My group pioneered the use of microfluidic devices in neuroscience research with the invention and commercialization of compartmentalized devices for primary neurons.

III. Dynamic spatial and temporal stimulation for enhanced cell differentiation.
In collaboration with Prof Olivier Pertz, we have developed a microfluidic platform for applying dynamic pulses and gradients of biochemical to single cells. Live-cell microscopy followed the differentiation and proliferation of stem cells such that we could direct response with programmed stimulation.

IV. 3D Cell culture platform for cancer metastasis and in-vitro network of perfusable blood and lymphatic vasculature
We described the first easy to use perfusable blood and lymphatic networks and platform for angiogenesis.

V. Vascularized organ on a chip applications. Vascularized skin, eye-on-a-chip, vascularized tumor on a chip, and others.

VI. Mass produced plastic devices using new microfluidic patterning principle for automated liquid loading for 3D cell culture of multiple cell types.

Complete List of Published Work in MyBibliography
https://www.ncbi.nlm.nih.gov/sites/myncbi/1zsTdpMTSn6kg/bibliography/57902076/public/?sort=date&direction=ascending

D. Research Support

Ongoing Research Support

Korean National Research Foundation Grant Jeon (PI) 05/01/18-04/30/21
Eye-on-a-Chip: Development of in-vitro eye model for drug screening
This project focused on developing microfluidic eye-on-a-chip model with blood vessels, nerve connections to model various eye related diseases. We have published several in-vitro eye disease models such as AMD and diabetic retinopathy.

Korea-German Industry Collaboration Project Jeon (co-PI) 10/01/16-09/30/19
Development of microfluidic immune assay platform
This collaborative international project with Prof. Andreas Kurtz at Charlite (Berlin, Germany) and Microfluidic ChipShop and Curiosis of Korea focused on developing a new microfluidic devices that can be used for simple immunoassay with the medical device. We developed a new patterning method that can pattern single cells over a large area in simple single step. ChipShop is responsible for production by injection molding, Charlite worked on the assay and Curiosis developed the fluorescence-based reader/machine.

Korean National Research Foundation Grant Jeon (co-PI) 05/01/18-04/30/21
Vascularized Tumor-on-a-Chip
This project focused on developing microfluidic device where array of tumor spheroids can be isolated cultured and connected to vasculature. This model will be used to test different nanoparticle based drugs and used in screening for anti-tumor drugs.
Role: co-PI

Completed Research Support

Korea Global Cosmetics Foundation, HN14C0090 Jeon (PI) 09/01/15-09/30/18
Vascularized Skin Chip Platform for New Cosmetic Evaluation
We have developed a PDMS (soft lithography) based vascularized skin on a chip platform that combine network of perfusable blood vessels underneath the skin. We have performed simple skin sensitivity assays using irritants. This work resulted in development of skin chip design, establishment of blood vessel-keratinocyte/fibroblast coculture conditions and preliminary assay conditions for testing skin irritants.

Korean National Research Foundation Grant Jeon (PI) 05/01/15-04/30/18
Eye-on-a-Chip: Development of in-vitro eye model for drug screening
This project focused on developing microfluidic eye-on-a-chip model with blood vessels, nerve connections to model various eye related diseases. We have published several in-vitro eye disease models such as AMD and diabetic retinopathy.

Korea-Switzerland International Collaboration Project Jeon (PI) 11/01/15-10/31/18
Neural Stem Cell Proliferation and Differentiation Control Using Dynamic Control of Single Cell MAPK Dynamics
This collaborative international project with Prof. Olivier Pertz at University of Basel focused on developing a new microfluidic devices that can deliver temporal and spatial pulses of chemical factors to control MAPK dynamics. Korean counterpart developed a new microfluidic device with integrated pulse control and the Swiss part worked on the stem cell biology.