Min Soh, Ph.D.

CTO & Head of R&D
HyeonTechNBio Inc.

Date of Birth:	1985. 06. 29.
Nationality:	Republic of Korea
Gender:	Male
Address:	Seoul National University, Rm. 628, Bldg. 220, 1st Gwanak-ro, Gwanak-gu, Seoul 08826, South Korea
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PROFESSIONAL CAREER

2022 – present
Chief Technology Officer (CTO) & Head of R&D
Center for Advanced Pharmaceutical Technology,
HyeonTechNBio Inc.

2020 – 2022
Senior Researcher
Center for Nanoparticle Research, **Institute for Basic Science (IBS)**
School of Chemical & Biological Engineering, **Seoul National University**

2019 – 2020
Staff Engineer
Material Development, Material Development Team
Semiconductor Processing Development, Process Development Team 1
Semiconductor R&D Center, **Samsung Electronics Co, Ltd.**

EDUCATION

2011 – 2019
Ph. D.
Chemical & Biological Engineering, **Seoul National University, Seoul, Korea**
Thesis title: *Ceria—Zirconia Nanoparticles for Enhanced Therapeutic Efficacy against Inflammatory Diseases*
Advisor: Taeghwan Hyeon

2009 – 2010
Research Internship
Chemistry, **Yonsei University, Seoul, Korea**
Advisor: Jinwoo Cheon

2006 – 2010
B.S.
Chemistry, **Yonsei University, Seoul, Korea**

ACADEMIC HONORS

2008
Academic Excellence Scholarship, **Yonsei University, Korea**

JOURNAL PUBLICATIONS

(Authorship as first or corresponding has been highlighted in bold with underlined.)

[20] Young Geon Kim, Yunjung Lee, Hyun Jyung Oh, Jinyoung Chu, Dokyoon Kim, Chi Kyung Kim, **Min Soh***, Sik Namgoong, Taeghwan Hyeon
"Ceria Nanoparticle-Entangled Reticulation for Angiogenic and Therapeutic Embrocation to Treat Diabetic Wound"
Submitted to Adv. Mater.

[19] Young Geon Kim, Boomin Choi, Yunjung Lee, Bohyung Lee, Hyun Min Kim, Ok Kyu Park, Yubeen Kim, Dokyoon Kim, **Min Soh***, Chi Kyung Kim, Taeghwan Hyeon
"Co-Delivery of Renal Clearable Cerium Complex and Synergistic Antioxidant Iron Complex for Treating Sepsis"
Submitted to ACS Nano

[18] Seungmin Baik, Hyunmin Kim, Yunjung Lee, Taegyu Kang, Kwangsoo Shin, Changyeong Song, Ok Kyu Park, Byeonggeun Kang, Nohyun Lee, Dokyoon Kim, Seung Hong Choi, Seung Han Kim, **Min Soh***, Taeghwan Hyeon, Chi Kyung Kim
"Orally Deliverable Iron-Ceria Nanotablets for Treatment of Inflammatory Bowel Disease"
Submitted to Adv. Healthc. Mater.

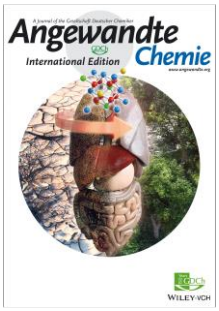
[17] Young Geon Kim, Yunjung Lee, Nohyun Lee, **Min Soh***, Dokyoon Kim, Taeghwan Hyeon
"Ceria-Based Therapeutic Antioxidants for Biomedical Applications"
Adv. Mater. **2023**, 2210819.

[16] Boomin Choi, **Min Soh**, Yelina Manandar, Dokyoon Kim, Sang Ihn Han, Seungmin Baik, Kwangsoo Shin, Sagang Koo, Hyek Jin Kwon, Junyoung Oh, Taeghwan Hyeon and Sung Joong Lee

"Highly selective microglial uptake of ceria–zirconia nanoparticles for enhanced analgesic treatment of neuropathic pain"
Nanoscale **2019**, *11*, 19437.

[15] **Min Soh**, Dong-Wan Kang, Han-Gil Jeong, Dokyoon Kim, Do Yeon Kim, Wookjin Yang, Changyeong Song, Seungmin Baik, In-Young Choi, Seul-Ki Ki, Hyek Jin Kwon, Taeho Kim, Chi Kyung Kim, Seung-Hoon Lee, and Taeghwan Hyeon
"Ceria–zirconia nanoparticles as an enhanced multi-antioxidant for sepsis treatment"
Angewandte Chemie International Edition **2017**, *56*, 11399.

Selected in *Angewandte Chemie* as "Inside Cover", "Hot Paper" and "News article" from News room for press release.
Highlighted in "Chemical & Engineering News" in *American Chemical Society* Jul 2017.
Highlighted in *Nanowerk*, "Multi-antioxidant nanoparticles to treat sepsis", Jul 2017.
Broadcasted in *Korean media*, "KBS News" and "YTN News", Jul 2017.
Listed in Top 10 research from *Institute for Basic Science (IBS)*, 2017.



[14] Sagang Koo, Hee Su Sohn, Tae Hee Kim, Siyeon Yang, Se Youn Jang, Seongryeol Ye, Boomin Choi, Soo Hyeon Kim, Kyoung Sun Park, Hyun Mu Shin, Ok Kyu Park, Cheesue Kim, Mikyung Kang, **Min Soh**, Jin Yoo, Dokyoon Kim, Nohyun Lee, Byung-Soo Kim, Youngmee Jung, Taeghwan Hyeon
"Ceria-vesicle nanohybrid therapeutic for modulation of innate and adaptive immunity in a collagen-induced arthritis model"
Nat. Nanotechnol. **2023**, *18*, 1502.

[13] Gwang-Bum Im, Young Geon Kim, Tae Yong Yoo, Yeong Hwan Kim, Kang Kim, Jiyu Hyun, **Min Soh**, Taeghwan Hyeon, Suk Ho Bhang
"Ceria Nanoparticles as Copper Chaperones that Activate SOD1 for Synergistic Antioxidant Therapy to Treat Ischemic Vascular Diseases"
Adv. Mater. **2023**, *35*, 2208989.

[12] Sang Ihn Han, Sang-woo Lee, Min Gee Cho, Ji Mun Yoo, Myoung Hwan Oh, Beomgyun Jeong, Dokyoon Kim, Ok Kyu Park, Junchul Kim, Eun Namkoong, Jinwoung Jo, Nohyun Lee, Chaehong Lim, **Min Soh**, Yung-Eun Sung, Jongman Yoo, Kyungpyo Park, Taeghwan Hyeon
"Epitaxially Strained CeO_2/MnO_4 Nanocrystals as an Enhanced Antioxidant for Radioprotection"
Adv. Mater. **2020**, *32*, 2001566.

[11] Kyoung Won Cho, Seok Joo Kim, Jaemin Kim, Seuk Young Song, Wang Hee Lee, Liu Wang, **Min Soh**, Nanshu Lu, Taeghwan Hyeon, Byung Soo Kim, and Dae-

Hyeong Kim
"Large-scale integrated smart cell culture platform for digital mass culture of anchorage dependent cells"
Nat. Commun. **2019**, *10*, 4824.

[10] Jonghoon Kim, Han Young Kim, Seuk Young Song, Seok-hyeong Go, Hee Su Sohn, Seungmin Baik, **Min Soh**, Kang Kim, Dokyoon Kim, Hyo-Cheol Kim, Nohyun Lee, Byung-Soo Kim, and Taeghwan Hyeon
"Synergistic oxygen generation and ROS scavenging by nanoparticles of manganese ferrite and ceria induce M2 polarization of macrophages for rheumatoid arthritis treatment"
ACS Nano **2019**, *13*, 3206.

[9] Hyek Jin Kwon, Dokyoon Kim, Kyungho Seo, Young Geon Kim, Sang Ihn Han, Taegyu Kang, **Min Soh**, Taeghwan Hyeon
"Ceria nanoparticle systems for selective scavenging of mitochondrial, intracellular, and extracellular reactive oxygen species in Parkinson's disease"
Angewandte Chemie International Edition **2018**, *57*, 9408.

[8] Hyek Jin Kwon, Kwangsoo Shin, **Min Soh**, Hogeun Chang, Jonghoon Kim, Jisoo Lee, Giho Ko, Byung Hyo Kim, Dokyoon Kim, and Taeghwan Hyeon
"Large-scale synthesis and medical applications of uniform-sized metal oxide nanoparticles"
Adv. Mater. **2018**, 1704290.

[7] Dokyoon Kim, Hyek Jin Kwon, Kwangsoo Shin, Jaehyup Kim, Roh-Eul Yoo, Seung Hong Choi, **Min Soh**, Taegyu Kang, Sang Ihn Han, and Taeghwan Hyeon
"Multiplexible wash-free immunoassay using colloidal assemblies of magnetic and photoluminescent nanoparticles"
ACS Nano **2017**, *11*, 8488.

[6] Dong-Wan Kang, Chi Kyung Kim, Han-Gil Jeong, **Min Soh**, Taeho Kim, In-Young Choi, Seul-Ki Ki, Do Yeon Kim, WookJin Yang, Taeghwan Hyeon, and Seung-Hoon Lee
"Biocompatible Custom Ceria Nanoparticles against Reactive Oxygen Species Resolve Acute Inflammatory Reaction after Intracerebral Hemorrhage"
Nano Research **2017**, *10*, 2743.

[5] Hyek Jin Kwon, Moon-Yong Cha, Dokyoon Kim, Dong Kyu Kim, **Min Soh**, Kwangsoo Shin, Taeghwan Hyeon, and Inhee Mook-Jung
"Mitochondria-Targeting Ceria Nanoparticles as Antioxidants for Alzheimer's Disease"
ACS Nano **2016**, *10*, 2860.

[4] Seok Joo Kim, Hye Rim Cho, Kyoung Won Cho, Shutao Qiao, Jung Soo Rhim, **Min Soh**, Taeho Kim, Moon Kee Choi, Changsoon Choi, Inhyuk Park, Nathaniel

S Hwang, Taeghwan Hyeon, Seung Hong Choi, Nanshu Lu, and Dae-Hyeong Kim
"Multifunctional Cell-Culture-Platform for Aligned Cell Sheet Monitoring, Transfer Printing, and Therapy"
ACS Nano **2015**, *9*, 2677.

[3] Donghee Son, Jongha Lee, Dong Jun Lee, Roozbeh Ghaffari, Sumin Yun, Seok Joo Kim, Ji Eun Lee, Hye Rim Cho, Soonho Yoon, Shixuan Yang, Seunghyun Lee, Shutao Qiao, Daishun Ling, Sanghun Shin, Jun-Kyul Song, Jaemin Kim, Taeho Kim, Hakyong Lee, Jonghoon Kim, **Min Soh**, Nohyun Lee, Cheol Seong Hwang, Sangwook Nam, Nanshu Lu, Taeghwan Hyeon, Seung Hong Choi, and Dae-Hyeong Kim
"Bioresorbable Electronic Stent Integrated with Therapeutic Nanoparticles for Endovascular Diseases"
ACS Nano **2015**, *9*, 5937.

[2] Jaemin Kim, Mincheol Lee, Hyung Joon Shim, Roozbeh Ghaffari, Hye Rim Cho, Donghee Son, Yei Hwan Jung, **Min Soh**, Changsoon Choi, Sungmook Jung, Kon Chu, Daejong Jeon, Soon-Tae Lee, Ji Hoon Kim, Seung Hong Choi, Taeghwan Hyeon, and Dae-Hyeong Kim
"Stretchable silicon nanoribbon electronics for skin prosthesis"
Nat. Commun. **2014**, *5*, 5747.

[1] Chi Kyung Kim, Taeho Kim, In-Young Choi, **Min Soh**, Dohoung Kim, Young-Ju Kim, Hyunduk Jang, Hye-Sung Yang, Jun Yup Kim, Hong-Kyun Park, Seung Pyo Park, Sangseung Park, Taekyung Yu, Byung-Woo Yoon, Seung-Hoon Lee, and Taeghwan Hyeon
"Ceria Nanoparticles that can Protect against Ischemic Stroke"
Angew. Chem. Int. Ed. **2012**, *51*, 11039.

Selected as VIP (Very Important Paper) and Back Cover.
Highlighted in *Nanowerk*, Sep 2012, "Ceria nanoparticles could lessen the damage from ischemic strokes."

INTERNATIONAL & DOMESTIC CONFERENCE PRESENTATIONS

- **Min Soh**, Taeghwan Hyeon
"Ceria-zirconia nanoparticles as an enhanced multi-antioxidant for sepsis treatment"
International Nanotech Symposium & Nano-Convergence Expo, Ilsan, Korea, July 11-13, 2018.

- **Min Soh**, Taeghwan Hyeon
"Ceria-zirconia nanoparticles as an enhanced multi-antioxidant for sepsis treatment"
The Korean Society of Industrial and Engineering Chemistry, Daegu, Korea, May 2-4, 2018.

- **Min Soh**, Taeghwan Hyeon
  "Ceria-zirconia nanoparticles as an enhanced multi-antioxidant for sepsis treatment"
  American Chemical Society National Meeting & Exposition, New Orleans, US, March 18-22, 2018.

- **Min Soh**, Taeghwan Hyeon
  "Ceria-zirconia nanoparticles as an enhanced multi-antioxidant for sepsis treatment"
  International Conference on Advanced Materials and Devices, Jeju, Korea, December 5-8, 2017.

- **Min Soh**, Taeghwan Hyeon
  "Ceria nanoparticles that can protect against ischemic stroke"
  International Conference on Advanced Materials, Jeju, Korea, October 25-29, 2015.

PATENTS

- Sang Woo Lee, Eun Hyuk Lee, **Min Soh**
  "Dental zirconia coated with ceria nanoparticles, composition comprising the same, and use thereof"
  - Country: Korea
  - Application No.: 10-2024-0056264

- Taeghwan Hyeon, **Min Soh**, Young Geon Kim
  "Nanocomplex and preparing method thereof"
  - Country: Korea
  - Application No.: 10-2024-0054327

- **Min Soh**, Jisoo Lee, Bo Hyeon Cho
  "Nanoparticle structure and manufacturing method thereof"
  - Country: Korea
  - Application No.: 10-2024-0001564

- **Min Soh**, Jimin Hwang
  "Nanoparticle structure for radiation protection and manufacturing method thereof"
  - Country: Korea
  - Application No.: 10-2024-0001546

- **Min Soh**, Sungyun Choi, Minah Kim, Boomin Choi
  "Complex agent for radiation protection"
  - Country: Korea
  - Application No.: 10-2023-0171901

- **Min Soh**, Jihwan Son, Jiwon Lee, Boomin Choi
  "Ointment composition for treating dermatitis"
  - Country: Korea
  - Application No.: 10-2023-0171905

- Seung Hong Choi, **Min Soh**, Jihwan Son, Bo Hyeon Cho
  "Composition for oral administration for radiation protection and hydrogel for radiation protection manufactured using the same"
  - Country: Korea
  - Application No.: 10-2023-0012513

- Seung Hong Choi, **Min Soh**, Jihwan Son, Bo Hyeon Cho
  "Nanoparticle structure for radiation protection and manufacturing method thereof"
  - Country: Korea
  - Application No.: 10-2023-0012472, PCT/KR2024/001421

- Taeghwan Hyeon, Dokyoon Kim, **Min Soh**
  "Nanoparticle and method of forming the same"
  - Country: Korea
  - Application No.: 10-2021-0152408

- Taeghwan Hyeon, Sung Joong Lee, **Min Soh**, Boomin Choi
  "Nanoparticle structure and method of forming the same"
  - Country: Korea
  - Application No.: 10-2018-0134987

- Taeghwan Hyeon, Seung-Hoon Lee, **Min Soh**, Chi Kyung Kim
  "Synthesis of ceria–zirconia nanoparticles and ceria–zirconia nano complex and its application as a therapeutic agent for sepsis"
  - Country: PCT/Korea
  - Application No.: PCT/KR2017/006617

- Seung-Hoon Lee, Taeghwan Hyeon, Chi Kyung Kim, Dong-Wan Kang, **Min Soh**
  "Ceria nanoparticles for treatment of nontraumatic intracranial hemorrhage"
  - Country: PCT/Korea
  - Application No.: PCT/KR2016/004123

- Taeghwan Hyeon, Seung-Hoon Lee, **Min Soh**, Chi Kyung Kim
  "Synthesis of ceria–zirconia nanoparticles and ceria–zirconia nano complex and its application as a therapeutic agent for sepsis"
  - Country: Korea
  - Application No.: 10-2016-0052102

TEACHING

2014	Teaching Assistant, Chemical and Biological Synthesis Experiment (Department of Chemical and Biological Engineering, Seoul National University (SNU), Seoul, Korea)
2012	Teaching Assistant, Chemical and Biological Synthesis Experiment

(Department of Chemical and Biological Engineering, Seoul National University (SNU), Seoul, Korea)

2011 Teaching Assistant, Inorganic and Material Chemistry
(Department of Chemical and Biological Engineering, Seoul National University (SNU), Seoul, Korea)

RESEARCH EXPERTISE & TECHNICAL SKILLS

Designing and synthesis of metal, metal-oxide, and silica nanomaterials

Synthesis of Au, Ag, Pt (noble metal) nanoparticles
Synthesis of cerium oxide, iron oxide, yttrium oxide, zirconium oxide nanoparticles
Synthesis of multifunctional silica nanoparticles with size-variation
(core-silica shell nanoparticles, mesoporous silica nanoparticles)
Synthesis of core-shell/satellite structure of nanoparticles
(e.g. iron-oxide (core)-mesoporous silica (shell)/cerium oxide(satellite))

Doping several ions into ceria nanoparticles

Synthesis of Zr-, Sm-, Gd-, Fe-, and Pd-doped ceria nanoparticles for their medical application and catalytic reactions (for multifunctional and enhanced performance)

Designing the nanomaterials with a variety of functional molecules

Conjugation of nanoparticles with polymer (with controls of chain length)
Conjugation of nanoparticles with biomolecules (e.g. antibody, protein and peptide)
Conjugation of nanoparticles with dyes (e.g. rhodamine, isothiocyanate, and cyanine)

Biomedical application with therapeutic nanoparticles

Ceria–Zirconia solid-solution nanoparticles to treat sepsis and allodynia (1st author paper)
Design nanoparticles to enhance therapeutic efficacy (chemically and biologically)
Synthesis of multifunctional nanoparticles (e.g. iron-oxide (core)-mesoporous silica (shell)/cerium oxide(satellite) for theranostic applications)
Synthesis of renal-clearable nanoparticles

Characterization of nanomaterials

Transmission Electron Microscopy
Scanning Electron Microscopy
Powder X-Ray Diffraction
Thermogravimetric Analysis
X-ray photoelectron Spectroscopy
Energy-dispersive X-ray Spectroscopy
UV-VIS Spectroscopy
Fluorescence Spectroscopy
Light Scattering Particle Size/Zeta potential Analyzer
Gas Adsorption Pore Analyzer
Photoluminescence Spectroscopy

Multimode Plate Reader

Imaging and analysis, and cell culture techniques

Confocal Laser Scanning Microscopy
Fluorescence (Cross) Correlation Spectroscopy (FCS/FCCS)
Flow cytometry
Isolation and Culturing cells