

# 고체 화학 및 에너지 과학 연구실

Solid-State Chemistry &  
Energy science Lab.



**김상륜**

교수

sangryun@gist.ac.kr

062-715-5328

<http://www.ssce-gist.com/>

## Education

- 2013** Ph.D. in Electronic Chemistry, Tokyo Institute of Technology
- 2009** B.S. in Chemical Engineering, Tokyo Institute of Technology

## Experience

- 2021 ~** Assistant Professor, Institute of Integrated Technology, GIST
- 2017 ~ 2021** Assistant Professor, Institute for Materials Research, Tohoku University
- 2016 ~ 2017** Visiting Researcher, Tokyo Institute of Technology
- 2014 ~ 2017** Postdoctoral Researcher, KAIST
- 2014** Postdoctoral Researcher, Tokyo Institute of Technology

## Professional Activities & Honors

- 2021** Ministry of Education, Culture, Sports, Science and Technology (MEXT) Scientist's award (similar as President award in Korea), MEXT
- 2020** Outstanding researcher Award, The Honda Memorial Foundation
- 2005 ~ 2009** Japan-Korea Joint Scholarship (President Kim Da-jung Scholarship) for Science and Engineering Students

## 연구실 소개

SSCE(Solid-State Chemistry & Energy science) 연구실에서는, 고체 화학을 기반으로 한 소재, 반응, 원리 및 이를 이용한 에너지 디바이스에 관한 연구를 수행하고 있습니다. 구체적으로는, 전극, 전해질, 계면 등의 다양한 소재를 이해하고 설계하는 연구를 통하여, 전고체전지, 리튬이온전지, 수계전지 등의 새로운 에너지 저장 디바이스를 창출하는 것을 목표로 하고 있습니다. 특히 SSCE 연구실은, 에너지와 관련된 미지의 과학 현상을 개척하기 위하여, 구성원의 독창적인 발상을 자유롭게 펼칠 수 있는 주체적인 연구를 추구합니다. 또한, 융복합 에너지 연구에 필요한 학문탐구능력 및 연구능력을 학습하여, 기초에서 응용, 그리고 실용성인 측면까지 정통한 전문지식을 갖춘 연구자로 성장할 수 있는 환경을 제공하고자 합니다.

## 연구 성과

### 수행중인 주요 연구과제 (주요과제경력)

- 수소화물계 전고체전지
- 전고체전지용 초이온전도체
- Design of hydride solid electrolytes for all solid-state batteries based on complex anion functionality (해외 과제)
- Development of crystal water containing solid-state materials (해외 과제)
- Multi-valent batteries using metal core/oxide shell nano-porous materials (해외 과제)

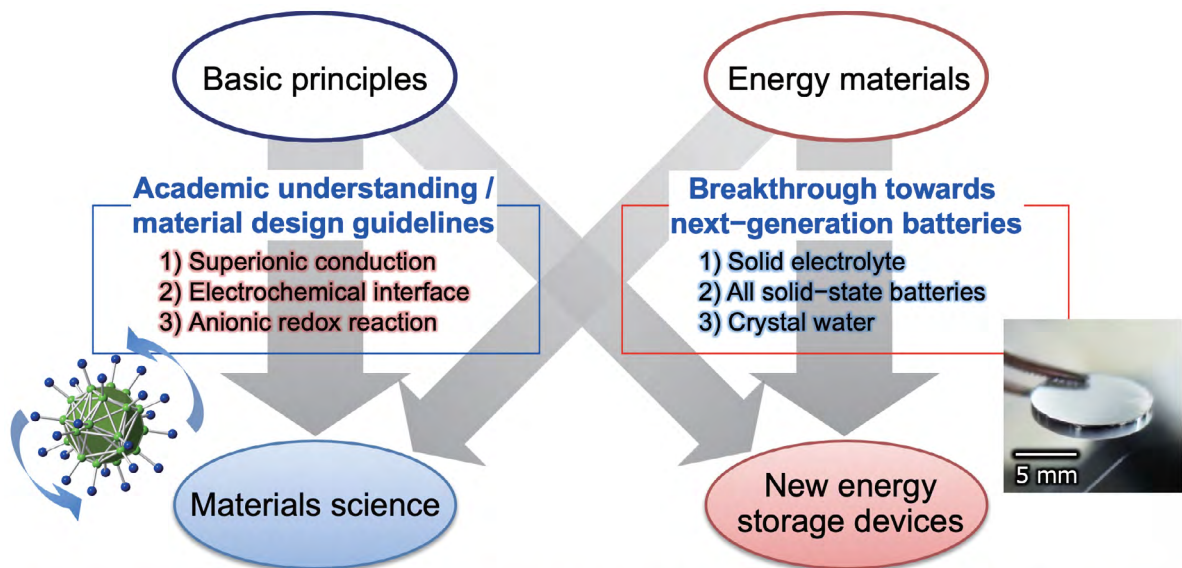
### 주요논문 (대표실적)

- A complex hydride lithium superionic conductor for high-energy-density all-solid-state lithium metal batteries, Nat. Commun., 10, 1081 (2019).
- A stable lithium-rich surface structure for lithium-rich layered cathode materials, Nat. Commun., 7, 13598 (2016).
- Direct observation of anomalous spinel-to-layered phase transition mediated by crystal water intercalation, Angew. Chem. Int. Ed., 54,15094-15099 (2015).
- The high performance of crystal water containing manganese birnessite cathodes for magnesium batteries, Nano Lett.,15, 4071-4079 (2015).
- Epitaxial growth and lithium ion conductivity of lithium-oxide garnet for an all solid-state battery electrolyte",Dalton Trans., 42, 13112-13117 (2013).

### 주요특허

- METHOD OF MANUFACTURING DISPERSION, SHEET, AND SECONDAR BATTERY, application (2020-192974).
- ION CONDUCTOR CONTAINING HIGH-TEMPERATURE PHASE OF LICB9H10, METHOD FOR MANUFACTURING SAME, AND SOLID ELECTROLYTE FOR ALL-SOLID-STATE BATTERY CONTAINING SAME IONC ONDUCTOR", publication (WO2020-040044).
- ION CONDUCTOR CONTAINING Li2B12H12 AND LiBH4, METHOD FOR PRODUCING SAME, AND SOLID ELECTROLYTE FOR ALL-SOLID-STATE BATTERIES, WHICH CONTAIN SAME ION CONDUCTOR", publication (WO2019-167813),
- LITHIUM-RICH ELECTRODE AND MANUFACTURING METHOD FOR THE SAME, publication (10-19-10884).

## 융합연구 및 비전



**New academic fields for energy science / materials / devices**