

Jeongsuk Seo, Ph.D.

Associate Professor

Department of Chemistry, Chonnam National University, Republic of Korea



RESEARCH & COLLABORATION PROFILE

KEYWORDS: Solar (sea)water splitting | Perovskite and layered perovskite oxynitrides | Semiconductor synthesis | Selective electrocatalysts | (Photo)electrocatalysis | HER | CER | OER/ORR

RESEARCH SNAPSHOT

Developing visible-light-responsive oxynitride semiconductors and (photo)electrocatalysis for efficient solar fuel production. The research integrates novel layered perovskite and perovskite oxynitride design, topotactic nitridation, defect/morphology control, and photoelectrode engineering to advance efficient and durable (sea)water splitting under neutral, chloride-containing environment.

RESEARCH EXPERTISE

- Synthesis design of perovskite and layered perovskite oxynitride semiconductors
- Novel synthesis route, doping engineering, band-gap engineering, defect control
- Two-dimensional, porous, and core-shell morphology architectures
- Solar water/seawater splitting and HER/OER/CER/ORR (photo)electrocatalysis

RECENT RESEARCH HIGHLIGHTS

- Established topotactic nitridation of $\text{La}_4\text{Ti}_3\text{O}_{12}$ to form a core-shell $\text{La}_4\text{Ti}_3(\text{O},\text{N})_{12}@\text{LaTiO}_2\text{N}$ photoanode for efficient photoelectrochemical water splitting (Small, 2026).
- Demonstrated chloride recirculation as a sustainable reaction pathway for solar seawater splitting over BaTaO_2N photoanodes (Inorg. Chem. Front., 2026).
- Developed layered-oxide-derived, less-defective 2D and porous $\text{LaTiO}_2\text{N}/\text{SrNbO}_2\text{N}/\text{ANbO}_2\text{N}$ platforms for neutral seawater and water splitting (2022-2024).

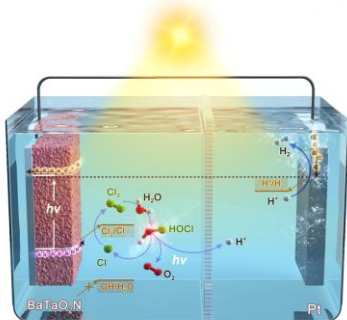
POTENTIAL COLLABORATION RESEARCH

Best-fit partners: solid-state chemistry | spectroscopy/microscopy | computation | device engineering

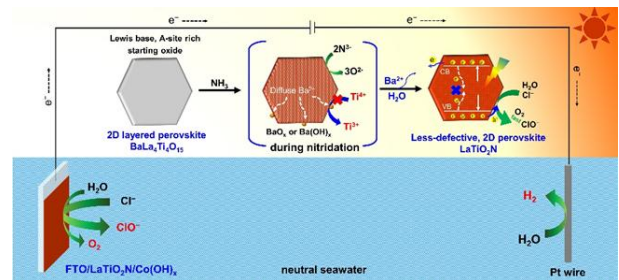
- Joint discovery and scalable synthesis of visible-light-active oxynitride semiconductors
- In situ/operando structural and spectroscopic analysis of nitridation, defects, and photocatalysis
- Integration of photoanodes with OER/CER/ORR catalysts for selective solar (sea)water splitting
- Durability testing and device development under neutral and saline operating conditions

SELECTED RECENT PUBLICATIONS

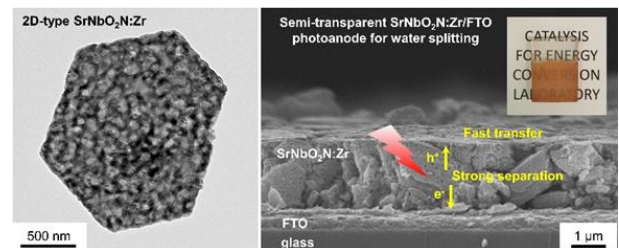
- J. Seo*, Y. Seo, O. Kwon, M. Ki, W. Lee. "Topotactic Nitridation Enabled Core-Shell $\text{La}_4\text{Ti}_3(\text{O},\text{N})_{12}@\text{LaTiO}_2\text{N}$ for Efficient Photoelectrochemical Water Splitting." *Small*, 22 (2026) e74514
- J. Seo*, S. Mun, V.-H. Trinh. "Sustainable Solar Seawater Splitting over a BaTaO_2N Photoanode Enabled by Chloride Recirculation." *Inorg. Chem. Front.*, 13 (2026) 51-62



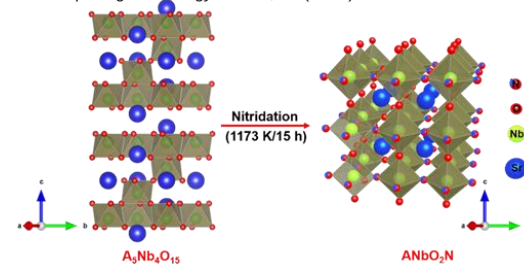
- T. T. T. Tran, J. Seo*. "Enhanced Neutral Seawater Splitting on Less-Defective, Two-Dimensional LaTiO_2N Photoanodes Prepared from Layered Perovskite $\text{BaLa}_4\text{Ti}_4\text{O}_{15}$." *J. Mater. Chem. A*, 12 (2024) 17128-17141



- V.-H. Trinh, J. Seo*. "Porous Cuboidal SrNbO_2N Crystals Grown on a Nb Substrate as an Active Photoanode for Neutral Seawater Splitting under Sunlight." *ACS Sustain. Chem. Eng.*, 11 (2023) 1655-1665
- T. T. T. Tran, V.-H. Trinh, J. Seo*. "Two-Dimensional Perovskite SrNbO_2N with Zr Doping for Accelerating Photoelectrochemical Water Splitting." *J. Mater. Sci. Technol.*, 142 (2023) 176-184



- S. Ramaraj, J. Seo*. "Intensive-Visible-Light-Responsive ANbO_2N (A = Sr, Ba) Synthesized from Layered Perovskite $\text{A}_5\text{Nb}_4\text{O}_{15}$ for Enhanced Photoelectrochemical Water Splitting." *J. Energy Chem.*, 68 (2022) 529-537



CONTACT

j_seo@chonnam.ac.kr | +82-62-530-3375

The Seo Research Group (Catalysis for Energy Conversion Lab)

<https://seolab.wixsite.com/seolab>

INTEGRATED MATERIALS-TO-PHOTOCATALYSIS RESEARCH STRATEGY

