VAN-HUY TRINH, Ph.D.

G-LAMP Postdoctoral Researcher

Department of Chemistry, Chonnam National University, Republic of Korea

RESEARCH & COLLABORATION PROFILE

KEY WORDS Solar Hydrogen, Chlorine Evolution Reaction, PEC Seawater Splitting, Oxynitrides Synthesis, Electrocatalyst Synthesis



Research Snapshot. Dr. Trinh develops semiconductor photoelectrodes for solar hydrogen production, with a focus on photoelectrochemical seawater splitting at near-neutral pH. His research combines direct growth of perovskite oxynitrides on conductive substrates, cocatalyst and interface engineering, and mechanistic analysis of charge transfer and reaction selectivity. His current work explores metal oxide-based photocathodes with high positive onset potentials to implement unbiased solar hydrogen production.

RESEARCH EXPERTISE

- Oxynitride photoanodes. Direct synthesis of $SrNbO_2N$/Nb and $BaTaO_2N$/Ta through anodization and nitridation.
- Cocatalyst and interface engineering. Co-based catalysts, Mo/Al doping and oxide interlayers to improve activity and chloride oxidation selectivity.
- Photocathode development. Cu_2O and $CuBi_2O_4$ synthesis, doping, heterojunctions and charge selective buffer layers for solar H_2 production.
- PEC evaluation. LSV, IPCE, stability, H_2 quantification, free chlorine analysis, EIS and Mott-Schottky$^-$ measurements.
- Materials and mechanism analysis. XRD, XPS, electron microscopy, STEM-EELS and local-pH measurements.

RECENT RESEARCH HIGHLIGHTS

- Directly grown $SrNbO_2N$. Developed porous cuboidal crystals on Nb as an active photoanode for neutral seawater splitting.
- Chloride recirculation. Contributed to $BaTaO_2N$ photoanodes retaining over 80% of initial photocurrent during 24 h operation.
- Dopant-controlled selectivity. Investigated (Mo,Al) -Co_3O_4/ $BaTaO_2N$/Ta, achieving approximately 73% Faradaic efficiency for free chlorine production.

POTENTIAL COLLABORATION RESEARCH

Best-fit collaborator areas: semiconductor materials, electrocatalysis, spectroscopy, electrochemical interfaces.

- 1. High-onset photocathodes. Joint development of Cu-based absorbers, selective contacts and protective layers for efficient HER at positive potentials.
- 2. Tandem PEC systems. Pairing photocathodes with oxynitride photoanodes toward stable, unbiased solar hydrogen production.
- 3. Selective seawater oxidation. Catalyst design and local-pH control to tune CER/OER competition in chloride containing electrolytes.
- 4. Mechanistic studies. Operando spectroscopy, advanced microscopy and collaborative calculations to link surface chemistry with charge transfer.

SELECTED RECENT PUBLICATIONS

- Chem. Eng. J., 2026, 182643. Local pH regulation through dopant engineering enhances chlorine evolution selectivity in solar-driven seawater splitting.
- Inorg. Chem. Front., 2026, 13, 51-62. Sustainable solar seawater splitting over a $BaTaO_2N$ photoanode enabled by chloride recirculation.
- ACS Sustain. Chem. Eng., 2023, 11, 1655-1665. Porous cuboidal $SrNbO_2N$ crystals grown on a Nb substrate as an active photoanode for neutral seawater splitting.

CONTACT

Trinhhuy120895@gmail.com | +82-10-6727-9998

REPRESENTATIVE RESEARCH FIGURES / SCHEMES





