Department of Chemistry & Chemical Biology
Waksman Institute of Microbiology

Charles Dismukes
Chemical & Biochemical Catalysis
2023-2024

Recent PhD Alumni

Karin Calvinho
CTO RenewCO2

Shinjae Hwang
Applied Materials
Semi-conductor Industry

Anders Laursen
CEO RenewCO2

Yifei Li
PhD Candidate

Shubham Gupta
PhD Candidate

Mahak Dhiman
Postdoc

Hengfei Gu
Postdoc

Henry Jin
PhD Candidate

Chris Turner
PhD Candidate

Recent Collaborators

Todd Deutsch
Yingying Chen
Ashlee Vise

Charles Musgrave
Aziz Alherz
Aaron Holder
Zack Bare

Andrew Rappe
Rob Wexler
Tian Qui

Rutgers University
MENTORING IMPRESSIONABLE MINDS
Undergraduate Students & Alumni (Last 3 years)

Alexander Kim
Sofia (Max) Dvinskikh
Ajay Kashi
Edward Izett

Kyra Yap
Sunjay Melkote
Devan Solanki
Lauren Ostopowickz

Anika Jalil
Tim Goetjen
Jonah Williams
Jack Weber

Stanford
Stanford National Lab
Yale
Arizona State
Northwestern
McDermott
Columbia
Energy for an overcrowded planet
Department of Chemistry & Chem Biology

Electro-Catalysts for Water Oxidation
-H₂ from water

Electro-Catalysts for CO₂ Conversion
Carbon-Negative Synthesis from Scratch

-2018

-2023

-2024 Polycarbonates for CO₂ Removal

Food for an overcrowded planet
Waksman Institute of Microbiology

Improving Photosynthesis in Vivo:
-Chokepoints in the PETC

Chokepoints in CO₂ Carboxylation:
-RuBisCO/ Calvin-Benson Cycle

Catalysis by Photosynthetic Enzymes:
-Photosystem II/Water Oxidation

Rutgers Startup from 5 RU patents
Carbon Negative Chemicals & Fuels from Scratch

Rutgers CO₂-Negative Technology

- Ni₅P₃
- Ni₄P₅
- Ni₃P
- NiP₄

**Fossil**

**Biomass**

**DAC**

water

electricity

**Transition Metal Phosphides**

**Electrolyzer #1**

**co-catalyst**

**CO₂**

**Future Targets**
- ethanol
- propanol
- C₄ butanol
- C₆ & diesel

**Formic acid**

**Ethylene glycol**

**Ethylene oxide**

**Acetic acid**

**Methylglyoxal**

**Furandiol**

**Furan**

**C₁**

**C₂**

**C₃**

**C₄**
Bottlenecks in Photosynthetic Reactions that Limit Biomass Production
Dismukes Waksman lab analytical toolbox

Powerful tools developed in our laboratory offer unique insights into biology