

Arrakis Materials



www.activate.org/arrakis-materials



Arrakis
MATERIALS

Minerals from CO₂



Arrakis Materials Founder



Activate



Mentored by



Ioana Knopf, CEO & Founder

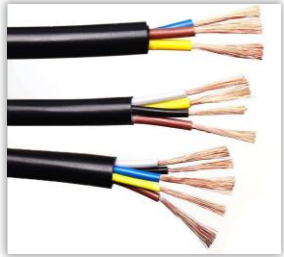
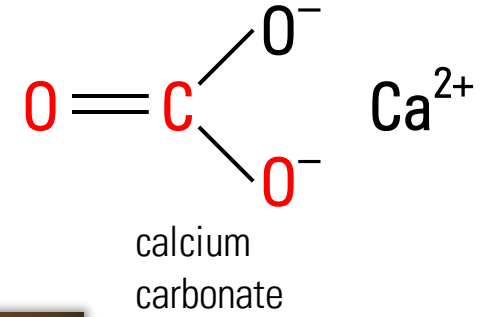
- UPenn MS & BA | Chemistry
- MIT PhD | CO₂ Utilization & Catalysis
- 10 publications & 3 patents
- 5 years of early-stage startup experience



We make carbonates!

Carbonates = Solid Form of CO₂

- Permanent Carbon Storage
- Ubiquitous Utilization



Accelerating Carbon Mineralization



- Silicate Minerals
- Wollastonite
 - Olivine
 - Pyroxene
- Carbon Dioxide

Carbon-Negative Material
Permanent CO₂ storage

☒ Natural weathering = geological timescales
e.g., 700-2100 years for olivine¹

¹ Beach weathering of olivine sand described in "Coastal spreading of olivine to control atmospheric CO2 concentrations: A critical analysis of viability", Hangx, S. J. T.; Spiers, C. J., Int. J. Greenhouse Gas Control 2009, 3 (6), 757-767.
² IPCC Special Report on Carbon dioxide Capture and Storage, Chapter 7: Mineral carbonation and industrial uses of carbon dioxide (2005), p. 319-338

Accelerating Carbon Mineralization



Silicate Minerals

- Wollastonite
- Olivine
- Pyroxene

Carbon
Dioxide

Carbon-Negative Material
Permanent CO₂ storage

☒ Natural weathering = geological timescales
e.g., 700-2100 years for olivine¹

☒ Accelerated weathering = high temperature & pressure
e.g., olivine 185°C & 148 atm, wollastonite 100°C & 39 atm²
→ energy intensive, expensive, difficult to scale

¹ Beach weathering of olivine sand described in "Coastal spreading of olivine to control atmospheric CO₂ concentrations: A critical analysis of viability", Hangx, S. J. T.; Spiers, C. J., Int. J. Greenhouse Gas Control 2009, 3 (6), 757–767.

² IPCC Special Report on Carbon dioxide Capture and Storage, Chapter 7: Mineral carbonation and industrial uses of carbon dioxide (2005), p. 319-338

Accelerating Carbon Mineralization



Silicate Minerals

- Wollastonite
- Olivine
- Pyroxene

Carbon
Dioxide

Carbon-Negative Material
Permanent CO₂ storage

- ☒ **Natural weathering = geological timescales**
e.g., 700-2100 years for olivine¹
- ☒ **Accelerated weathering = high temperature & pressure**
e.g., olivine 185°C & 148 atm, wollastonite 100°C & 39 atm²
→ **energy intensive, expensive, difficult to scale**
- ☑ **Arrakis Materials Process = fast & low-energy**
≤ 2 days at room temperature & pressure

¹ Beach weathering of olivine sand described in "Coastal spreading of olivine to control atmospheric CO₂ concentrations: A critical analysis of viability", Hangx, S. J. T.; Spiers, C. J., Int. J. Greenhouse Gas Control 2009, 3 (6), 757–767.

² IPCC Special Report on Carbon dioxide Capture and Storage, Chapter 7: Mineral carbonation and industrial uses of carbon dioxide (2005), p. 319-338

Early Stage



- Founded Fall 2022
- Funded with Grants & Fellowships
- Activate Boston Cohort 2023



- Bench scale experiments focused on increasing the %CO₂ uptake
- Material characterization & process optimization



- Looking for new uses for our carbon-negative minerals
- **Let's chat about your needs!**



Thank you!

info@arrakismaterials.com

