PLUGANDPLAY

NOVEMBER 19-21 2024

SILICON VALLEY SUMMIT

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NOVEMBER 19-21 2024

SILICON VALLEY SUMMIT



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New Materials & Packaging Expo

SV SUMMIT



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OPENING REMARKS

Robert Grey

Director, New Materials & Packaging

Plug and Play

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Technology Focus Areas

Advanced Packaging Technologies and Materials



- Bio-based plastics
- Lightweighting technologies
- Alternative coatings, adhesives, and inks

Carbon Neutral and Negative Materials



- Bio-based materials
- Inorganic CO_2 materials
- CO_2 sequestration

Circular Materials and Technologies

- Green chemistry
- Closed loop systems
- AI-powered waste management/ materials discovery

Resource Management



- Water resiliency
- Chemical process improvement tech
- Energy reducing processes
- Precious resource extractions

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Portfolio Updates



May 2024

Airlines Leaning into SkySelect's Procurement AI to Lead Digital Transformation of Their Parts Procurement Processes

June 25, 2024

As AI adoption increases in aviation, airlines and MROs are flocking to SkySelect to become more efficient, save money and reduce purchasing cycle times.

ARTICLE | August 2, 2024

Checkerspot and Cambium combine to create high-performance foams

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NEW MATERIALS
& PACKAGING

Thank you, Partners!



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NEW MATERIALS
& PACKAGING

2024 Partner Highlights

JOIN THE PLATFORM
PNPTC.COM/JOIN

CRH INNOVATION WEEK
March 2024

Topic: Pilot Management, Circularity, Construction Industrialization & Water Management

SHERWIN-WILLIAMS INNOVATION DAY
October 2024

Topic: Retail Customer Experience, Data Capture, E-commerce and Customer Data Analytics

INX INNOVATION DAY
November 2024

Topic: Digital Printing for Packaging

ADVANCED MATERIALS SHOWCASE
November 2024

Topic: Semiconductors, Batteries, Electronics, Sustainable Materials, Human Life

Upcoming Events

DEC 3	Tech Exploration: Circular Materials & Technology
DEC 10	Tech Exploration: Resource Management
JAN 14	Ecosystem Roundtable: Carbon Neutral & Negative Materials
FEB 11	Ecosystem Roundtable: Circular Materials & Technologies
APR 2	Flagship Event

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& PACKAGING

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KEYNOTE SPEAKER

Sirisha Kuchimanchi

Founder & CEO

Sahita Technologies

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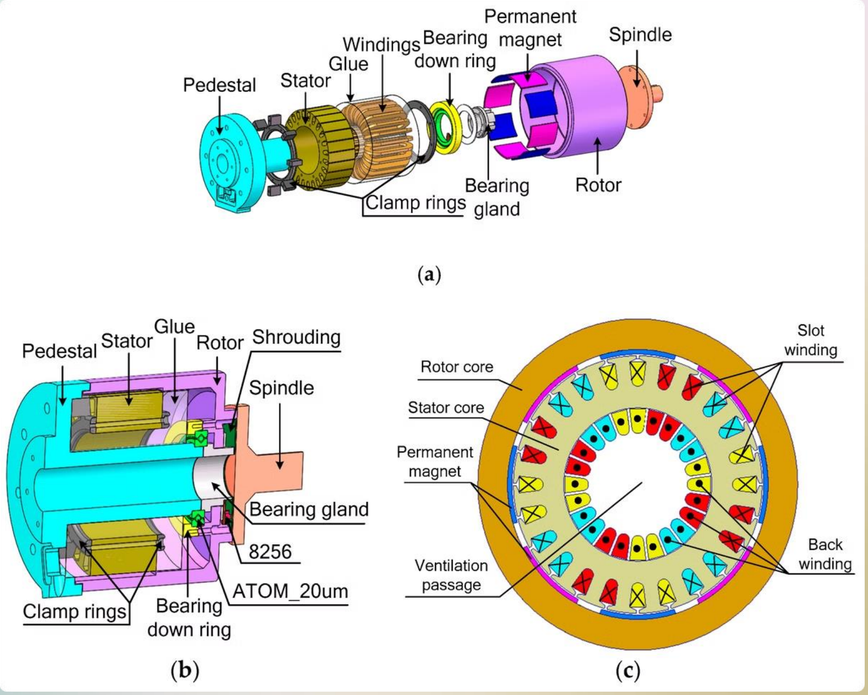
Materials Discovery in a Converging World

Dr. Sirisha Kuchimanchi

Sahita Technologies





Personal Background in Science

1

2007

Ph.D. thesis on rare earth permanent magnets

2

2010

China restricts rare earth exports, controlling 40% production

3

Post-2010

Urgent search for rare earth magnet alternatives



New Frontier in Materials Discovery

1 **Geopolitical Influence**

Material discovery affected by global political dynamics

2 **Environmental Challenges**

Sustainability concerns drive new material requirements

3 **Technological Demands**

Materials must power advanced technologies responsibly



Electric Vehicles and Strategic Materials

Critical Materials

Lithium and cobalt crucial for EV batteries

Supply Challenges

Political instability and environmental impacts in mining regions

Sustainable Alternatives

Research for recyclable materials and new battery technologies

Power Grid Concerns

Increasing EV adoption strains existing electrical infrastructure

AI Energy Demand and Advanced Materials

AI Energy Consumption

Projected 10-30% of world's energy in next decade

Semiconductor Advancements

SiC and GaN materials for high-performance, efficient chips

AI Infrastructure

Power Infrastructure, run efficiently & sustainably



Circularity and AI-Driven Discovery

1

Circular Economy

Designing materials for full lifecycle reuse and recycling

2

Constraints

Geo- politics, material availability & access

3

AI Integration

Use AI to drive new materials...for AI & Quantum applications



Collaboration in Overcoming Constraints

Cross-Industry Partnerships

Collaboration essential for addressing shared challenges

Academic Integration

Universities partnering with industry for applied research

Government Initiatives

Focused on creating industry-relevant research collaborations



Introducing XTRIUM

Where Materials meet Applications

Problem	Solution
Missed revenue opportunity	Cross-industry material application
Inefficient material discovery	AI-powered discovery and matching
Sustainability gaps	Optimization for efficiency and circularity

Shaping the Future of Materials Innovation

1 **Global Alignment**

Materials discovery addressing sustainability, security, and resilience

2 **Collaborative Approach**

Cross-sector cooperation crucial for overcoming challenges

3 **Call to Action**

Utilize platforms like Xtrium to drive sustainable innovation



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Master of Ceremonies

Alejandro Nieto

Senior Ventures Analyst

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Startup Presentations

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STARTUP PRESENTATION

Kumu

Kumu

Transforming Food, Plants, and Minerals into Circular Bioplastic Products

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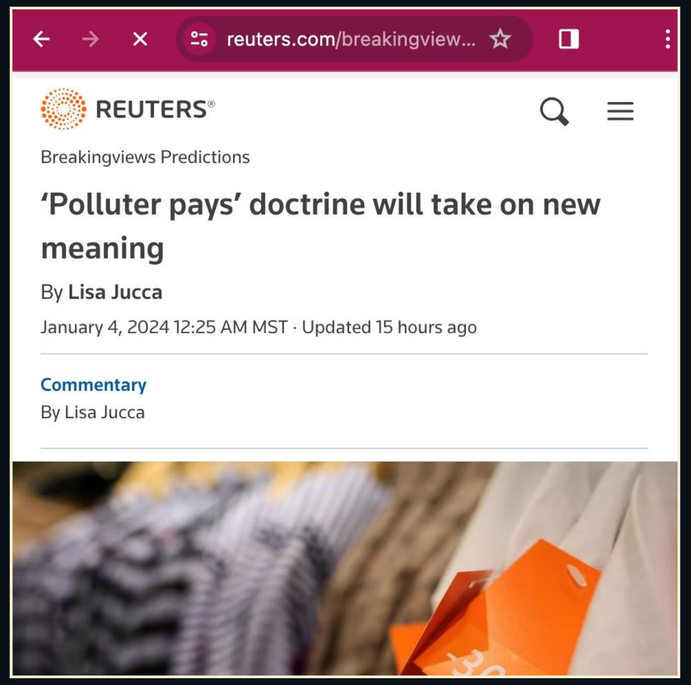
Kumu

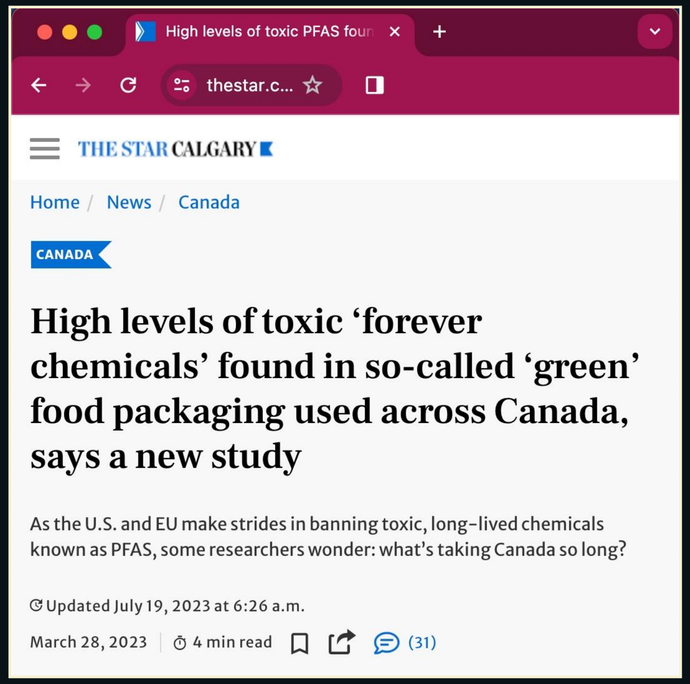
BIOPLASTIC ALTERNATIVES FROM FOOD, PLANTS, & MINERALS

NOVEMBER, 2024 | hello@kumu.ca

THE WRITING IS ON THE WALL



Extended Producer Responsibility



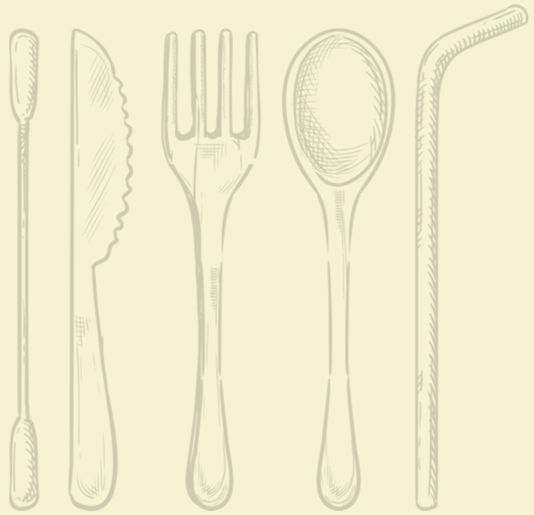
Toxic Chemical Additives Ban

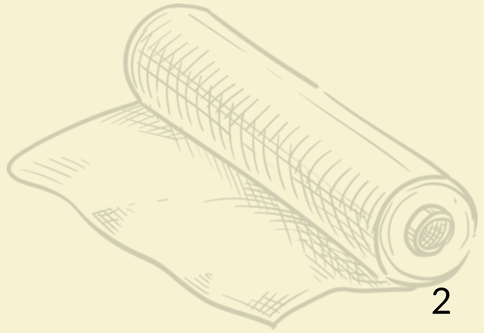


Greenwashing Legislation

PROBLEM

SINGLE-USE PLASTIC PRODUCT





SOLUTION

WE Transform food, plant materials, and minerals into BIOPLASTIC ALTERNATIVES.



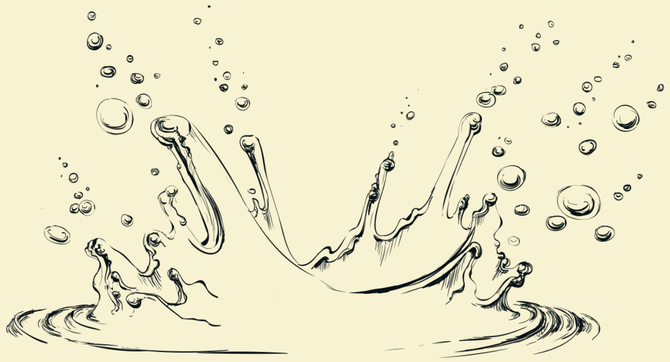





A bioplastic system as pervasive as plastic



+



+



FORM

- Films
- Coatings
- Rigids
- Foams
- Textiles/Threads
- Leather/Suede
- Vinyl-like Alt.
- Labels/Paper Alt.

FEATURES

- Water Resistance
- Grease Resistance
- Low Vapour Permeability
- UV Resistance
- Flame Retardant
- Absorbant
- Thermoplastic
- Boilable
- Dissolvable
- Freeze Tolerance
- Colour

TIME

- Shelf Life
- Performance Life
- Early Life (Sourced from Agricultural Waste)
- End-of-Life (Recover or Biodegrade)

COMPETITIVE LANDSCAPE

Biopolymers (Seaweed, Plant, Gums, Protein, Chitin, Mycelium)

NotPLA
seaweed products

Zerocircle
seaweed products

Cruz Foam
chitin foam

Lolliware
resin, straw, utensils

Searo
seaweed products

B'ZEOS
seaweed products

customized formulas
specific to an application

Xampla
customized plant/protein products

Ecovative
customized mycelium products

Own Product Lines

Customized Product Lines

MiTerro
bio-based film

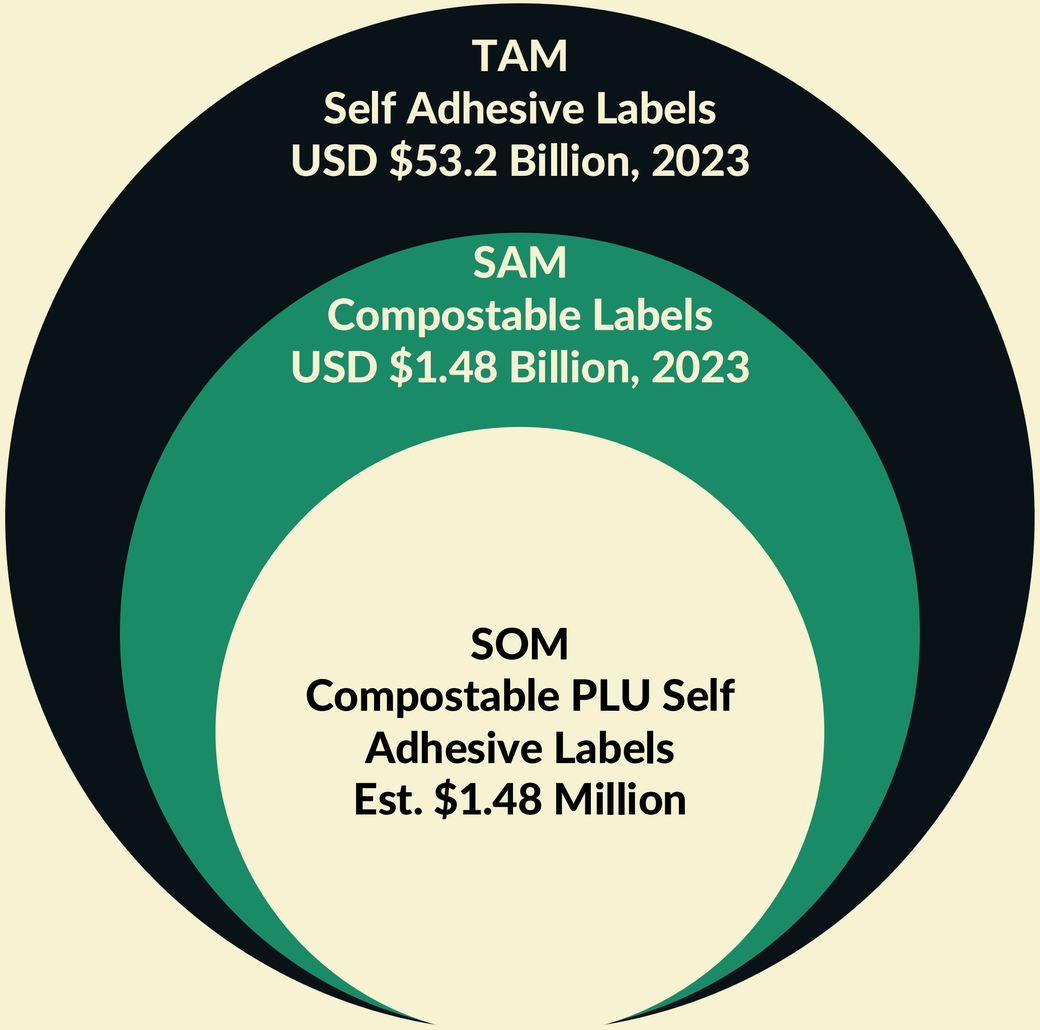
Shellworks
microbial

SWAY
seaweed thin film, resin

Erthos Inc.
starch, microbial

PLA, PVA, PVOH, PBS, PHA/PHB

The ability to customize PROVIDES MARKET FLEXIBILITY



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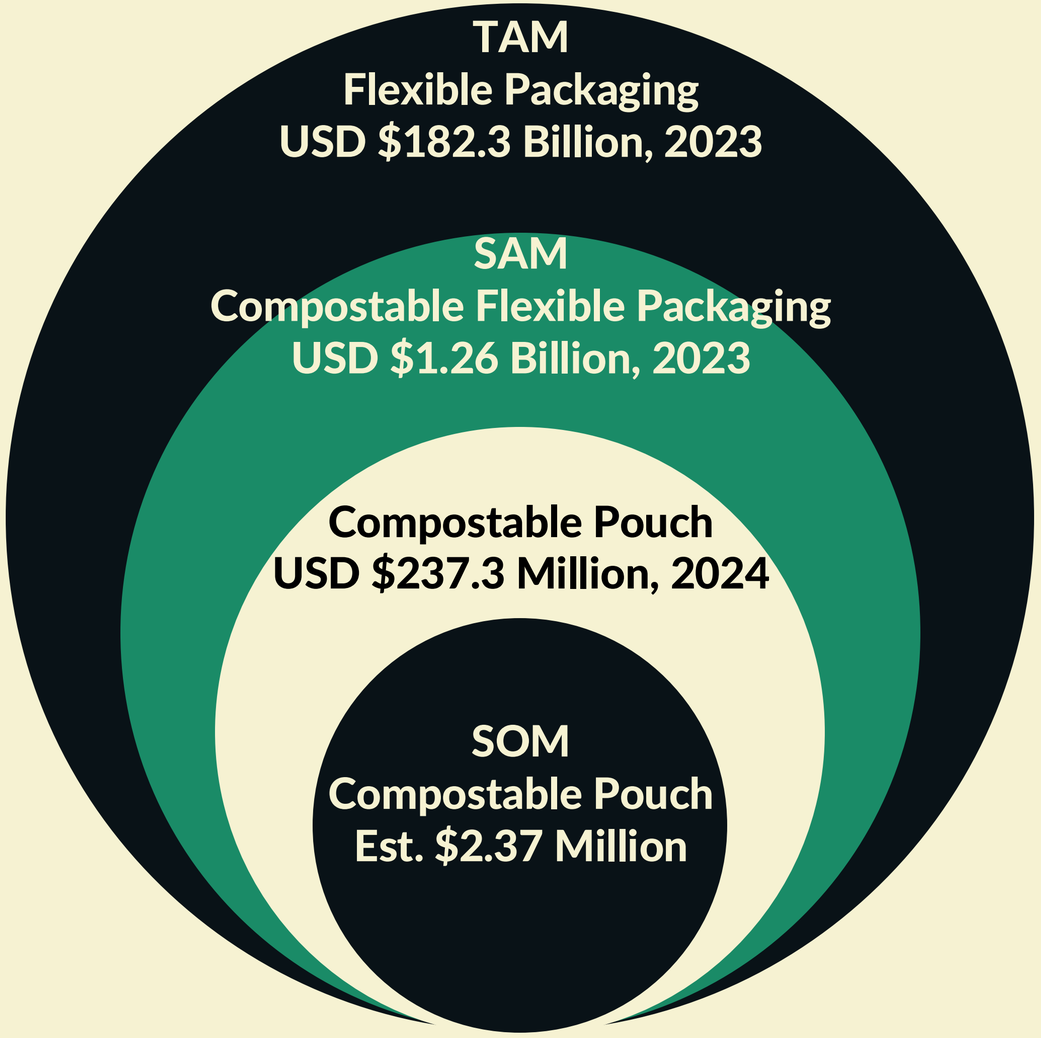

&...



BECOME A global LEADER In sustainable BIOPRODUCTS THROUGH COLLABORATION

- non-perishables packaging
- textiles
- healthcare
- food packaging
- recycling of our products

STEADY PROGRESS

FIRST MOU/LOI SIGNED
Fall 2023

PCT FILED
Summer 2024

FIRST JOINT VENTURE
2025

THE ASK

$150k

- MATERIAL TESTING & CHARACTERIZATION FOR PATENT & SALES



$100k

- PATENT APPLICATION IN SELECT COUNTRIES (PCT)

$250k

- SALES & MARKETING
- BUSINESS DEVELOPMENT OR LEAD RESEARCHER

~$82k

PERSONAL INVESTMENT (BOOTSTRAPPING) FOR RESEARCH, MATERIALS, & IP

HAVE AN AWESOME DAY!



REBECCA UNG, FOUNDER & CEO

- Multidisciplinary Background
- Microbiology, Software Engineering, Marketing, Design, and Franchise Development (Associate Model) Experience

ADVISORS

- Jack Cohen - Mentor, La Foundry
- Peter Zhou - Technical Advisor, Carbon Upcycling Technologies
- Trevor Dietrich - Technical Advisor, Plastic Manufacturing
- Patrick Kim - Joint Agreements, NeoElement Petroleum Consulting

CONTACT

Phone: +1 (403) 918-7484
Email: info@kumu.ca
LinkedIN: https://www.linkedin.com/in/rebeccaung/

APPENDIX

SLIDE 3 REFERENCES

- https://www.thestar.com/news/canada/high-levels-of-toxic-forever-chemicals-found-in-so-called-green-food-packaging-used-across/article_399762f8-2bc3-50d0-8582-94a0659f68ee.html
- https://gowlingwlg.com/en/insights-resources/articles/2023/the-regulation-of-greenwashing/
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- https://www.globenewswire.com/news-release/2024/03/18/2847972/0/en/Compostable-Flexible-Packaging-Market-Size-to-Surpass-USD-2-11-Bn-by-2032.html#:~:text=The%20global%20compostable%20flexible%20packaging,5.9%25%20between%202023%20and%202032.
- https://www.futuremarketinsights.com/reports/compostable-pouches-market

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STARTUP PRESENTATION

Oleo
Sustainable Palm Oil Solutions

Oleo Sustainable Palm Oil Solution

Oleo transforms biomass waste into sustainable oil products

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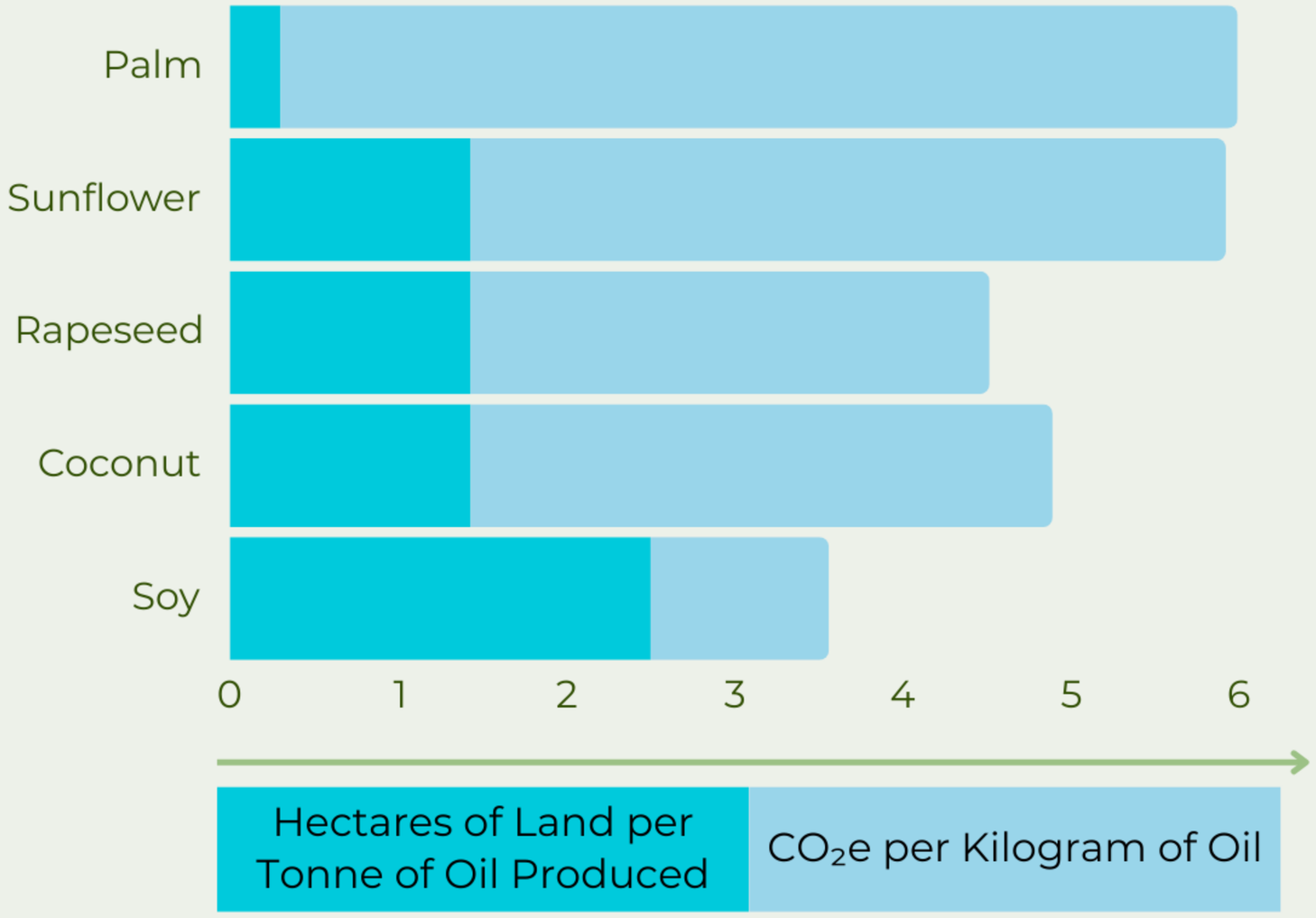
Oleo

Sustainable Palm Oil Solutions

Transforming waste into sustainable oil products

Gabriella Dweck co-CEO/CPO
Kelly Redmond co-CEO/COO

Conventional Oilseeds are Carbon Intensive, Drive Land Conversion, and Compete with our Food System



Conventional seed oil production relies on clearing arable land, which drives deforestation as demand increases and directly competes with our food system.

We are in need of a non-food compete oil to meet rising demand while preserving natural resources and reducing emissions.

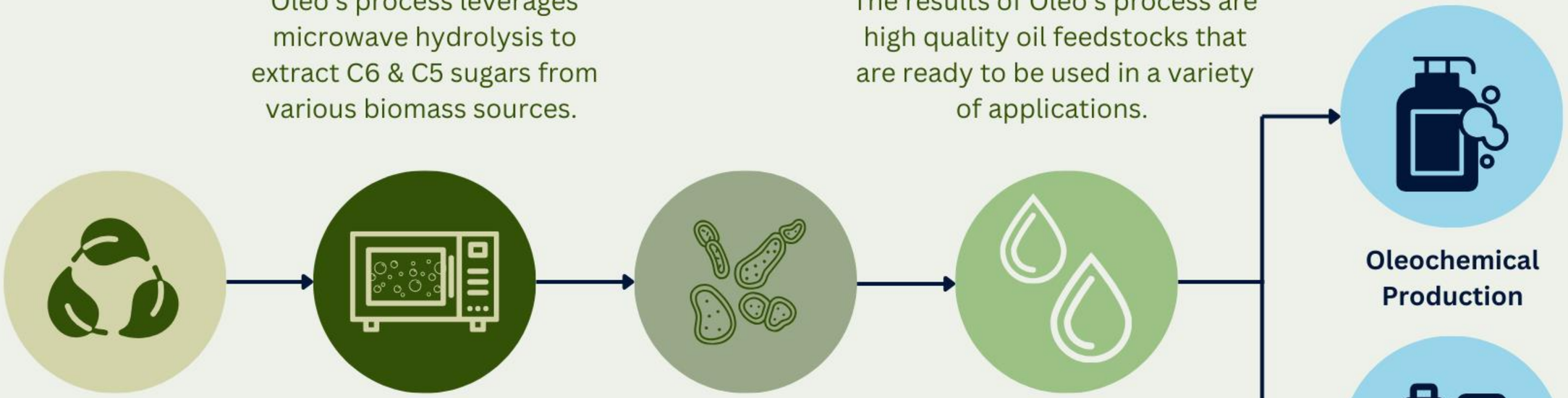
Oleo’s Technology Harnesses Untapped Biomass Waste to Create a Low-Carbon Bio-oil without Arable Land

2. Biomass Deconstruction

Oleo's process leverages microwave hydrolysis to extract C6 & C5 sugars from various biomass sources.

4. High value oil feedstocks

The results of Oleo's process are high quality oil feedstocks that are ready to be used in a variety of applications.



Oleochemical Production

Biofuel / SAF Production

1. Recycled biomass

Oleo's process can use a wide variety of biomass waste as primary inputs ranging from food waste to waste produced via bioremediation projects.

3. Fermentation

Those cellulosic sugars are then used as a substrate for the fermentation of an oleaginous yeast.

Oleo's Process is Biomass Agnostic Enabling us to Source Multiple Biomass Inputs

Forest Residues

- Grey Pine
- Eucalyptus
- Pinyon & Juniper
- Redwood
- Black Oak
- Live Oak
- Valley Oak
- Ponderosa Pine
- Cedar
- Douglas Fir

Macro Algae

- Dictyota
- Graclaria
- Asparagopsis
- Halymenia
- Ulva

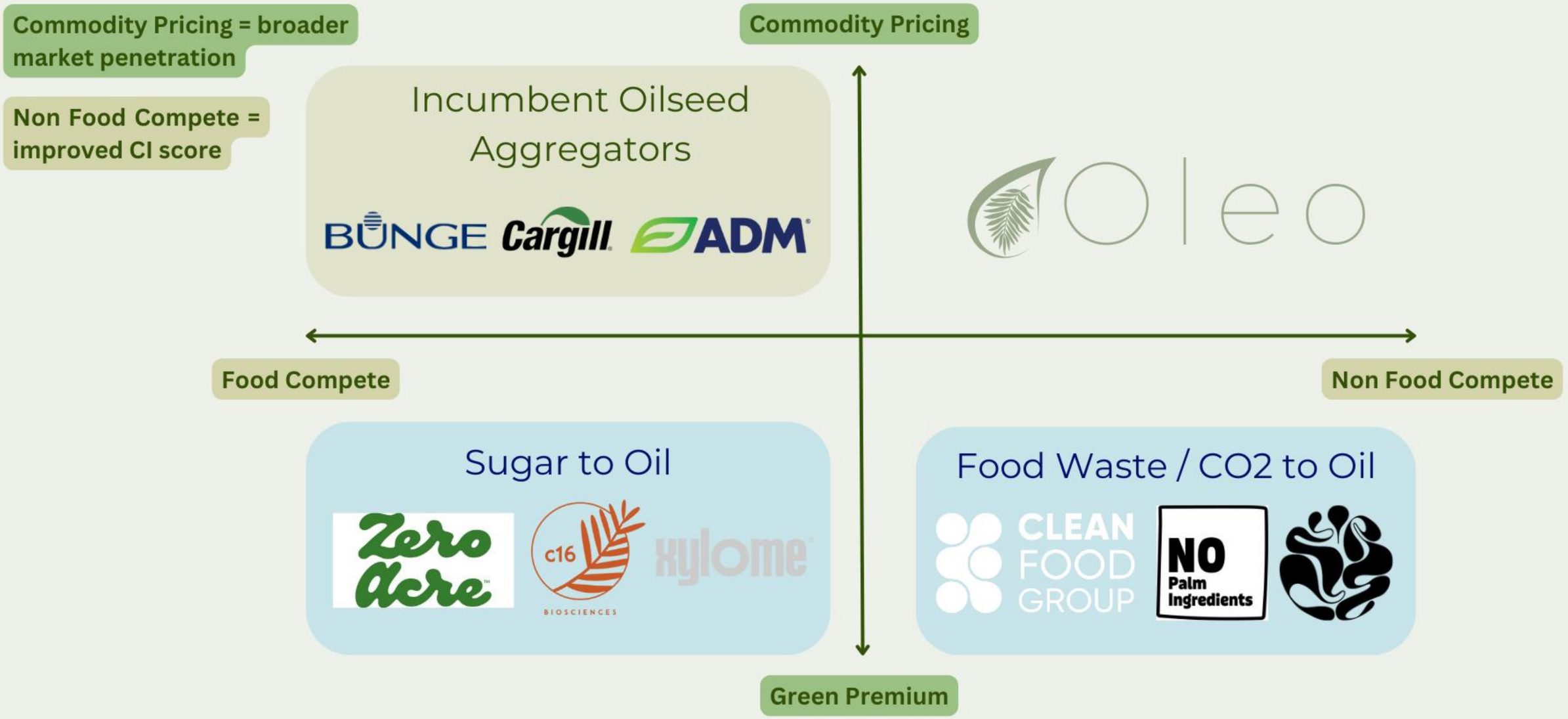
Food & Agricultural Waste

- Palm Fronds
- Wine Pomace
- Coffee Grounds
- Tea Leaves

We have successfully applied our process at the benchtop scale to valorize 19 different sources of biomass waste across three different sectors.

Our highest yields to date have been using pomace and macroalgae as an input.

Oleo's Technology will Produce Sustainable Oils for Commodity Markets



Oleo's Product can Slash **1.64 Gigatons** of Scope III Emissions Annually while Serving a **$19.5 Billion USD** Market

As an Oleochemical Feedstock



$3.8 Billion

US Market in Specialty Oleochemicals across CPGs and Industrial Applications

11.4 Million tonnes

carbon emissions abated annually

As a Biofuel Feedstock



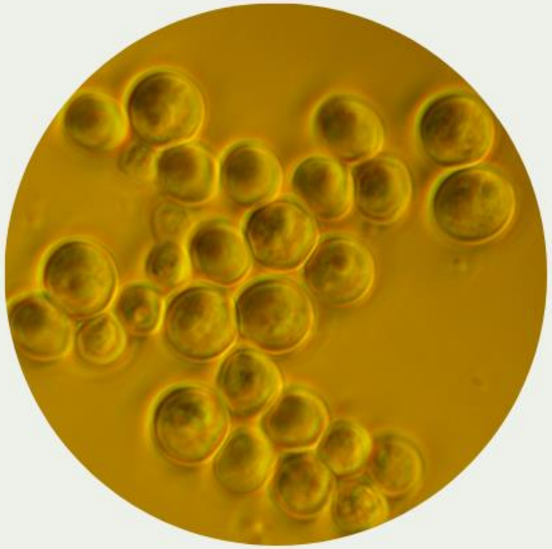
$15.7 Billion

US Market in HEFA Feedstocks for SAF Production

1.63 gigatons

carbon emissions abated annually

Established Traction with Feedstock Suppliers and Potential Customers



Oil Production for Compatibility Testing



3 Waste Valorization Projects



2 MTAs with Potential Customers

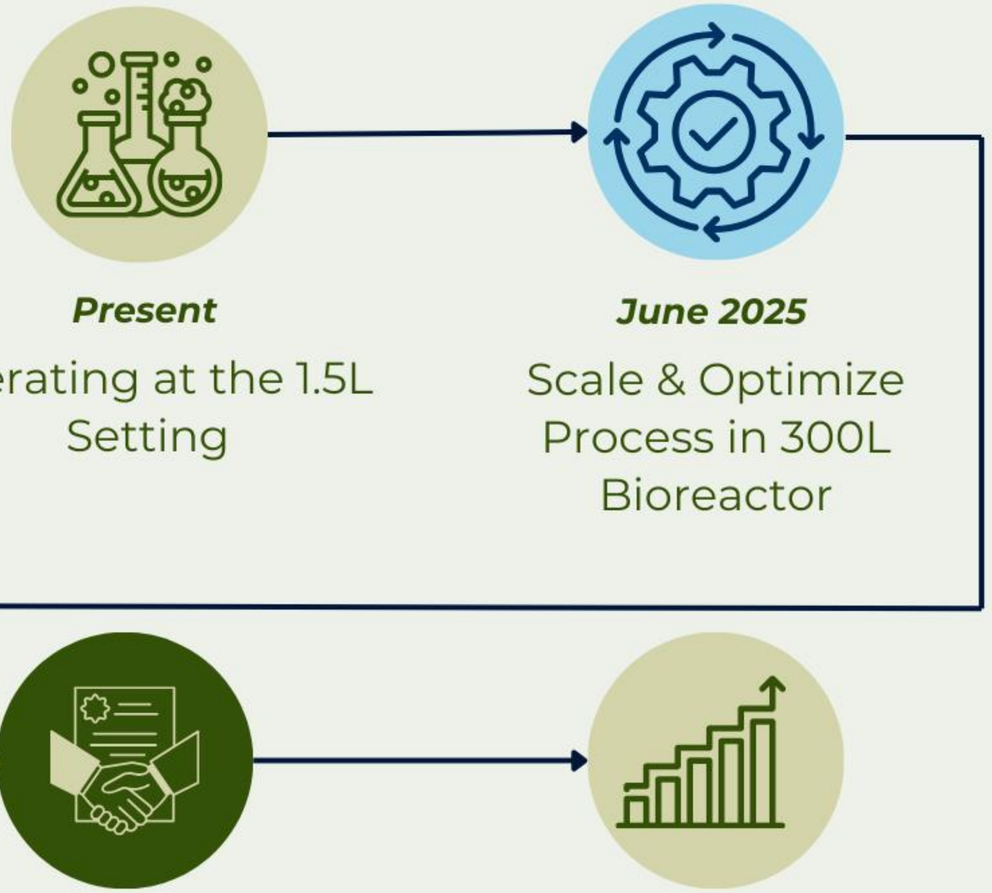
Oleo's IP Stack Provides Effective Barriers to Entry, Enabling us to Win in the Market

Oleo's technology was originally invented at Stanford University by Oleo's founders and will be exclusively licensed to the company.

Additionally, Oleo is developing custom hardware for a continuous microwave hydrolysis pretreatment process and engineering its yeast strain, which will generate IP owned by the company outright.

- Custom Microwave Hardware
- Engineered Yeast Strain
- 6 Month Exclusive Option
- Exclusive License
- Methods Patent for End-to-End Process through Stanford University

Commercialization Timeline



Present

Operating at the 1.5L Setting

June 2025

Scale & Optimize Process in 300L Bioreactor

September 2025

Obtain Offtake Agreement for Pilot Demonstration

June 2026

Deploy Pilot Scale Demonstration

Commercialization Timeline

Present

Operating at the 1.5L Setting

June 2025

Scale & Optimize Process in 300L Bioreactor

September 2025

Obtain Offtake Agreement for Pilot Demonstration

June 2026

Deploy Pilot Scale Demonstration

Seeking Partnerships Along our Value Chain



Biomass Waste Producers



Oleo



Chemical Manufacturers



Consumer Goods Producers



Biofuel Producers

Oleo SPOS is Led by Engineers with Expertise in Product Development & Operations Management



Gabriella Dweck
co-CEO/CPO

MS Engineering, Design Impact
BS Biomedical Engineering

Three years of industry experience in new product development, process, and manufacturing engineering.



Kelly Redmond
co-CEO/COO

MS Engineering, Design Impact
BS Environmental Engineering

Five years of experience as an officer in the US Army leading large scale environmental projects.

Activate
ALPINE
TomKatCenter
FOR SUSTAINABLE ENERGY
UNIVERSITY OF HAWAI'I
STATE OF HAWAI'I
StartX
cyclotronroad
BERKELEY LAB
AB PDU

oleo

Sustainable Palm Oil Solutions

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kelly@oleospos.com

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STARTUP PRESENTATION

FLO Materials

Commercializing a family of novel circular plastics that enables endless recycling without compromising on performance, efficiency, and profitability for multi-plastic products

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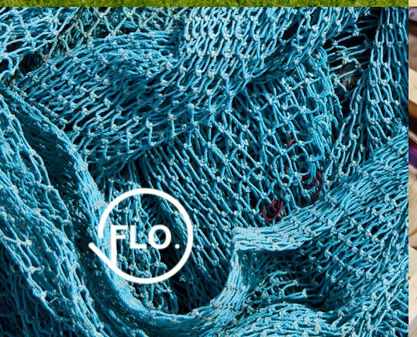



FLO Materials

Redesigning Plastics
Redefining Recycling

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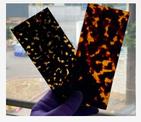
FLO Materials is commercializing a circular plastics platform that enables endless recycling from contaminated waste streams without compromising quality and efficiency; integrating performance, sustainability, and profitability for multi-plastic products.

2022

Technical validation, Incorporation, secured funding and lab space

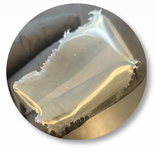
2023




Minimum viable product demonstrations

2024





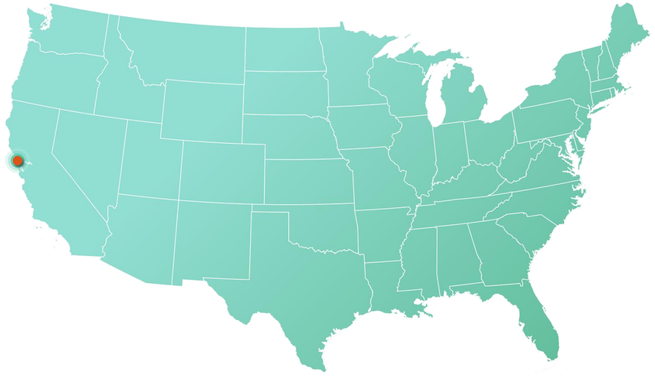
Expand Platform and IP Portfolio, >1kg scale, lower feedstock costs, NSF non-dilutive grant



Kezi Cheng

PhD | CEO

- Engineering PhD, Harvard
- Materials Science & Management BS, MIT
- Activate Fellow, NSF Fellow, Forbes 30



HQ in Santa Barbara CA

- R&D Facilities
- Polymer Production
- Product Development

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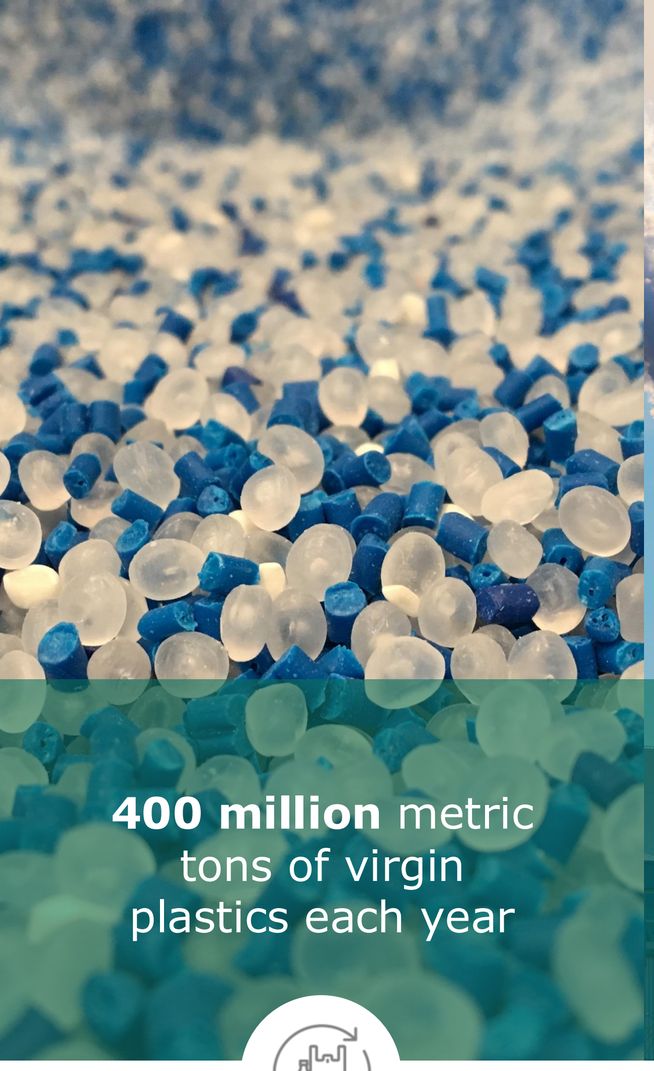

400 million metric tons of virgin plastics each year



Account for **3.4%** of global GHG emissions



80% of plastics end up in a landfill



We ingest **5 grams** of microplastics every week

Plastics Today < 10% of plastic waste is recycled

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Circular plastics can lower dependance on virgin production



Multi-layer/components

1.6 billion masks ended up in the ocean in 2020



Plastic metal composites

Influx of investment in renewables will lead to 43 million tons of decommissioned turbine blades by 2050



Mixed plastic products

300 million pairs of shoes in USA in landfills
22 billions pairs disposed globally yearly

Recycling of useful products today poses **massive challenges**



Harsh Recycling Conditions

Large scale recycling require high E, high T and additional catalysts

Performance degradation

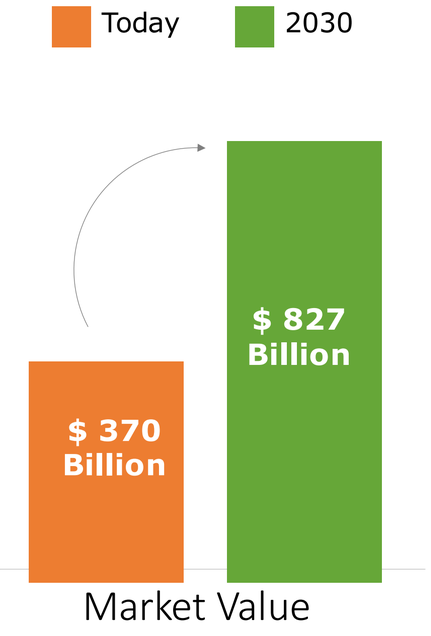
Can't recycle numerous cycles while preserving performance

Logistics Barriers

Difficulty in sorting and collecting waste and lack of material traceability and transparency

Expensive to recycle

Cheaper to make virgin plastics 21% of recycled materials are used to make new products



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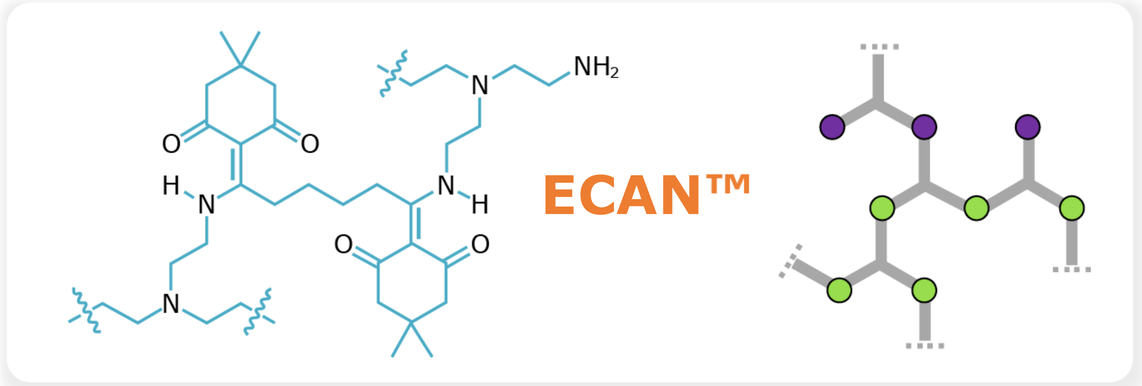
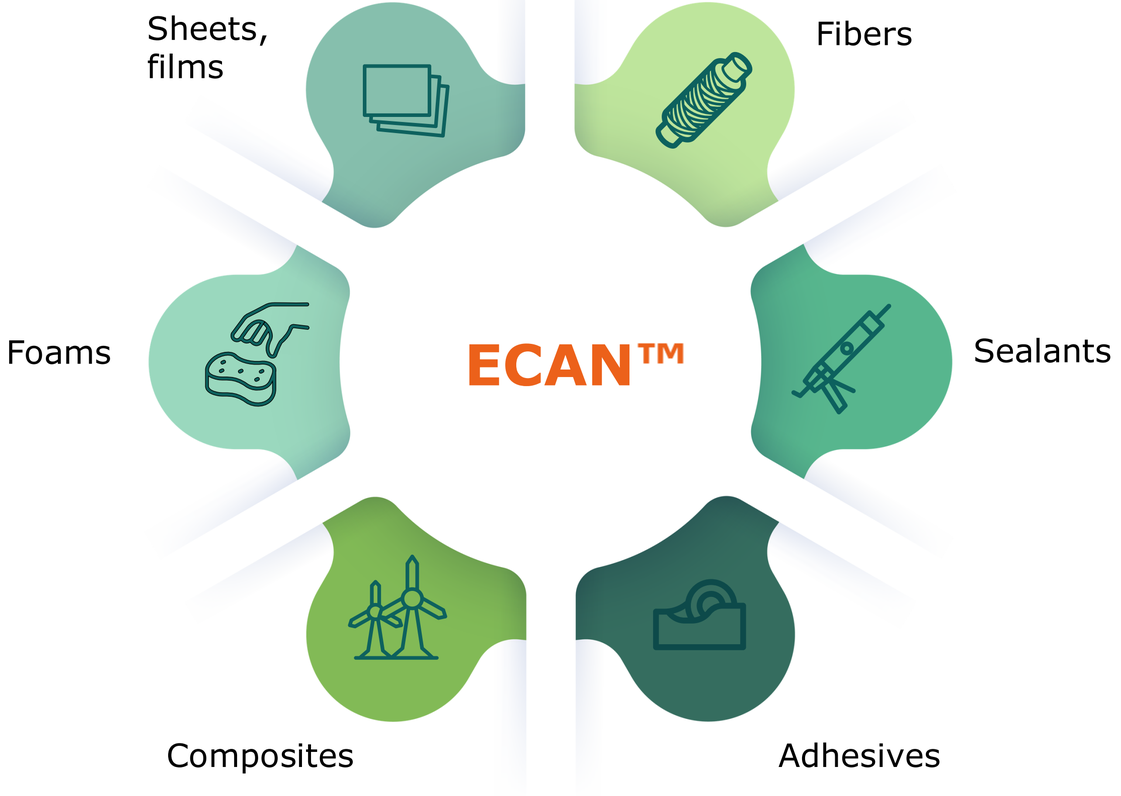
Polymers designed for the **circular economy**

Enamine Covalent Adaptive Networks = Environmentally Conscious Alternatives



Designed for versatility, these polymers yield materials spanning various strengths and aesthetics.

Manufacturable into a wide range of form factors and products.



Secured IP (3 PCTs; 1 National Stage; Exclusivity in Eyewear)

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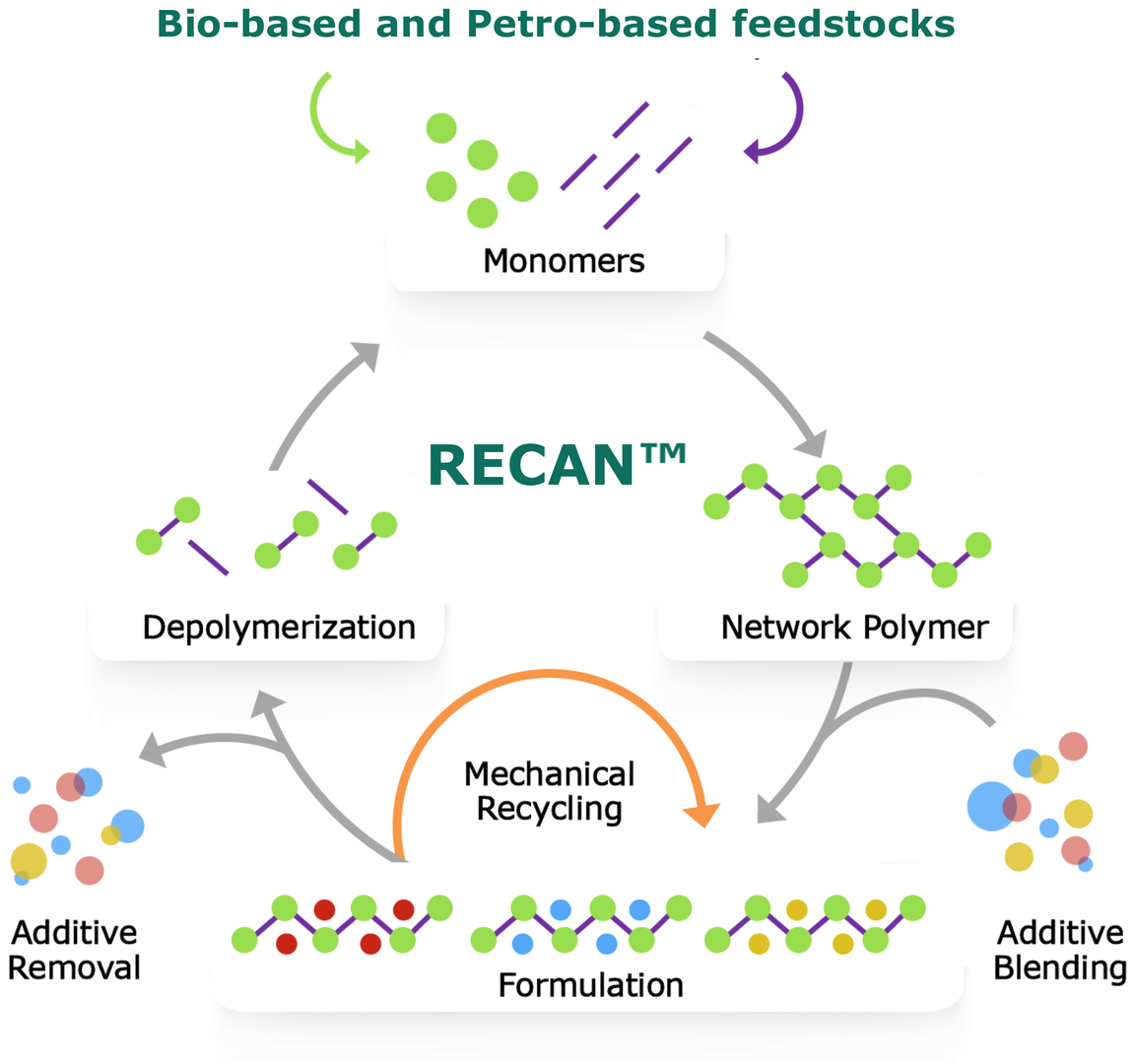
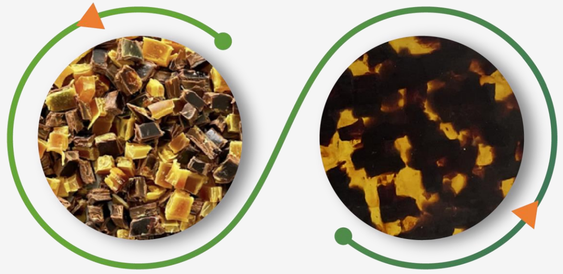
ECANs **bridge performance and recyclability**



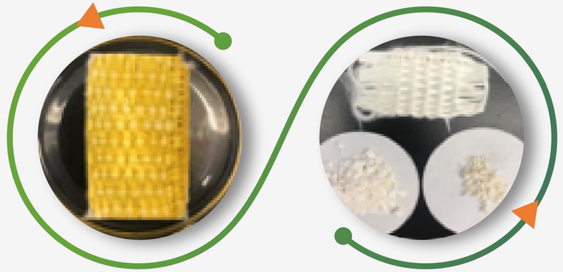
Thermal reprocessing
of fully cured network polymers through rapid bond exchange



Chemical depolymerization
Low T <60C
Catalyst free
Polymer to monomer conversion



Mixed waste recycling and additive removal
Separation of plasticizers, additives and metals, glass, and other plastics



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FLO’s ECAN product platform

ECAN Sheets



- High strength and modulus, Tg>90C
- Can be compression molded and extruded



ECAN Elastomers



- Conformable to varied surfaces
- Elastomeric properties for coatings and films





ECAN Fibers



- Melt spun fibers
- Wide range of manufacturable temperatures





ECAN Adhesives



- Debondable and recyclable
- Excellent flexibility, durability, and adhesion for bonding dissimilar materials





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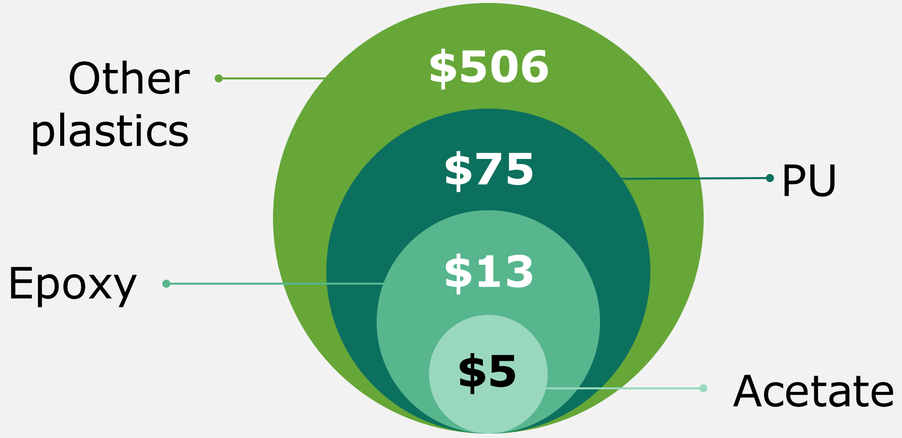
FLO's **addressable market** opportunities

Resin TAM in Billions



Performance Plastics

25% of all plastics in volume

0.3% recycling rate

$130 billion market value



Substituting for **high waste, high margin plastics** allows ECANs to be cost competitive while providing unparalleled sustainability opportunities in waste mitigation and CO_2 reduction.

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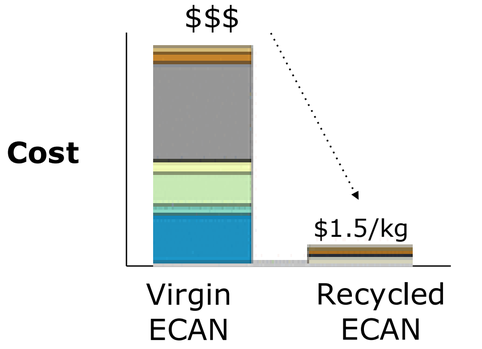
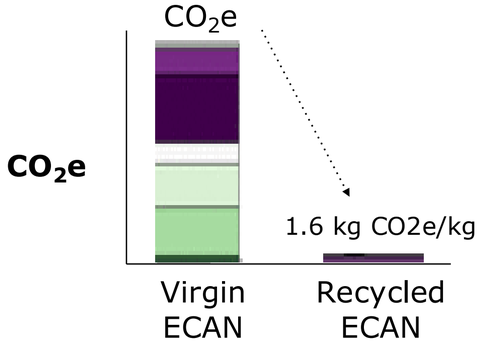
Strong **economic and logistics incentives** to produce and recycle

Recycling drives downward pressure on COGS and CO_2e

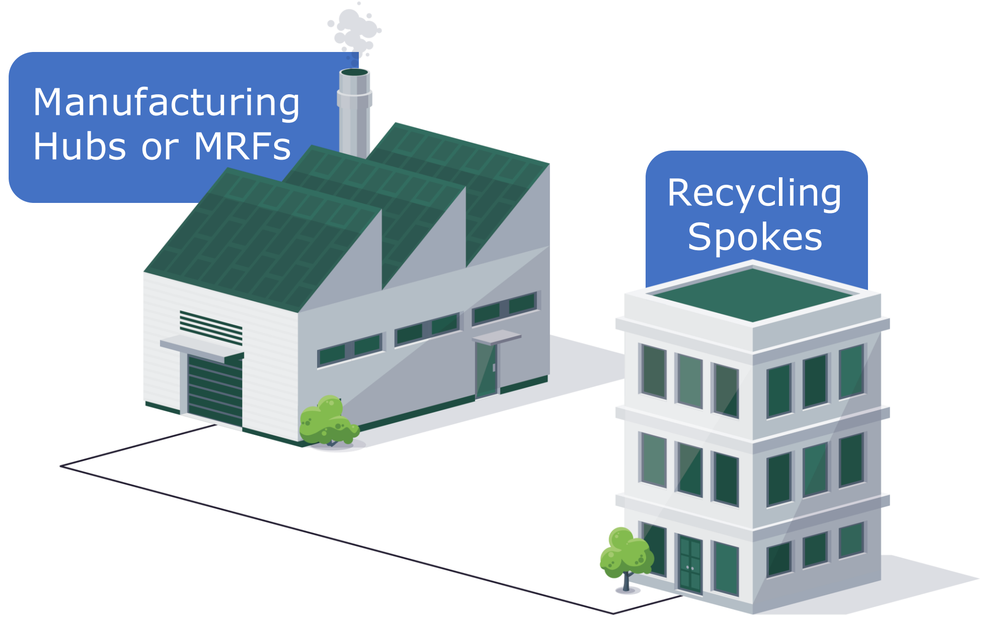


Recycled ECANs are **10-20x** lower in $/kg than virgin ECANs



Recycled ECANs are **significantly** lower in CO_2e/kg than virgin ECANs

Hub and Spoke Model simplifies logistics and shortens supply chain



FLO's recycling facilities requires limited footprint with low temperature acid bath allowing co-location with where waste is produced or collected.

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Eyewear is the **ideal beachhead market**



Cellulose Acetate Resin



Acetate Sheets



Subtractive Frame Manufacturing



Final Product

High Degree of Waste

- **80-90% of waste** in existing manufacturing process
- 250,000 tons of waste per year with **low recycling**
- Existing companies **pay to get rid of waste**

Drop-in to Existing Manufacturing Process

- ECANs utilize same **sheet and frame manufacturing techniques** as acetate
- Highly **concentrated manufacturing** facilities

Market Opportunity

- **1.5 billion** plastic frames/yr
- Global eyewear: $170B
- Virgin ECAN can achieve **price parity of acetate sheets ($20-50/kg)**
- **No ‘Made in USA’ glasses**

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ECAN based infinitely recyclable eyewear

Sheet Development



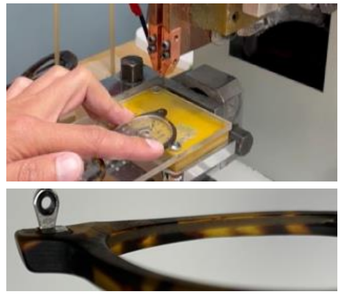
Laser cutting | Ultrasonic friction welding



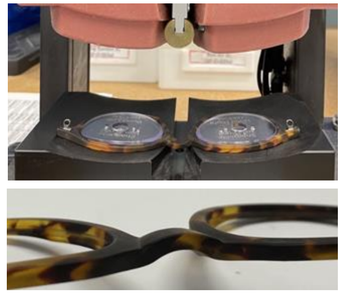
CNC Machining



Hinge Insertion



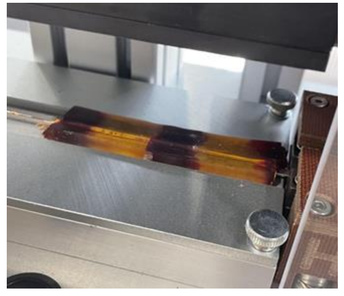
Nose Bending



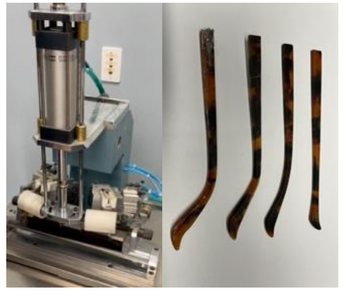
Temple Cutting



Core Insertion



Temple Bending + Angling



Tumbling + Engraving



Final Frame Product



Mechanical Recycling



Chemical Recycling



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Raising **$2M on $9M pre-money** SAFE to achieve commercial viability

- Launch eyewear **pilots**
- Reach **tonnage** production volume
- **Sell** virgin and recycled ECANs
- Validate **circular logistics**
- **Joint development** for additional products & verticals



Pilot scale



Manufacturing facility



Manufacturing cluster

	2025	2026	2027
Growth Milestones	**Line Mfg Demo**	**Generating Revenue**	**Recurring Revenue**	**Profitable with Recycling**
ECAN Production Volume	**400 Kg**	**1,000 Kg**	**10,000 Kg**	**100,000 Kg**
Recycled %	**0%**	**20%**	**50%**	**60%**
Revenue	**$40,000**	**$100,000**	**$500,000**	**$4,500,000**
Recycling Site	**HQ**	**HQ**	**Onsite of manufacturer**	**Cluster hub**

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FLO's MOAT

Name	Recycling Process	Recycled Performance	Monomer recovery	Feedstock	Tunability	Cost	Time to revenue	Product Categories
FLO.	**Chemical and mechanical**	**Recycled and upcycled**	**High yield** in mixed waste streams, low temperature, catalyst free ✓	Mix petro/bio based	**Highly Tunable** ✓	Moderate	**1-2 years**	Rigid sheets, Elastomer, foams, fibers, composites (thermoplastics and thermosets)
Cyklos Materials	Chemical and mechanical	Recycled and upcycled	✓	Synthetic biology	Limited	Prohibitively Expensive	5+ years	Toys and Accessories
MALLINDA	Mechanical	Recycled	✗	Petro-based	✗	Moderate	Revenue generating	Composites
ADITYA BIRLA GROUP	Chemical	Downcycled	✗	Petro-based	✗	Moderate	Revenue generating	Composites, epoxy (turbine blades)
ROCKYTECH	Mechanical	Downcycled	✗	Petro-based	✗	Low	1-2 years	Films

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Build The Plastics of The Future With Us



CEO, PhD

Kezi Cheng

- Materials Scientist, PhD Harvard; BS MIT
- Activate Fellow, NSF Fellow
- Forbes 30 Under 30



Chemist, PhD

Melissa Sanchez

- PhD Chemistry, UCSB
- Synthesis of biomass derived thermosets
- Research on closed loop PA 6/6,6 molecular recycling



Operations

Leah De Leon

Finance and BA, AA in Paralegal, 20+yrs Financial analyst at Charles Schwab



PT Chemist, PhD

Lucca Trachsel

- Postdoc, Matyjaszewski and Sumerlin Groups
- PhD Polymer Chemistry, ETH Zurich



Advisor

Thomas McDonald, PhD

Former Founder & CEO of Mosaic Materials



Advisor

Lene Hoegh

Sustainable Eyewear Expert



Advisor

Felek Jachi., PhD

Former VP R&D at W.R. Grace



Advisor

Karan Dikshit, PhD

Expertise in dynamic covalent chemistry

Elings Hall, Santa Barbara, CA 93106

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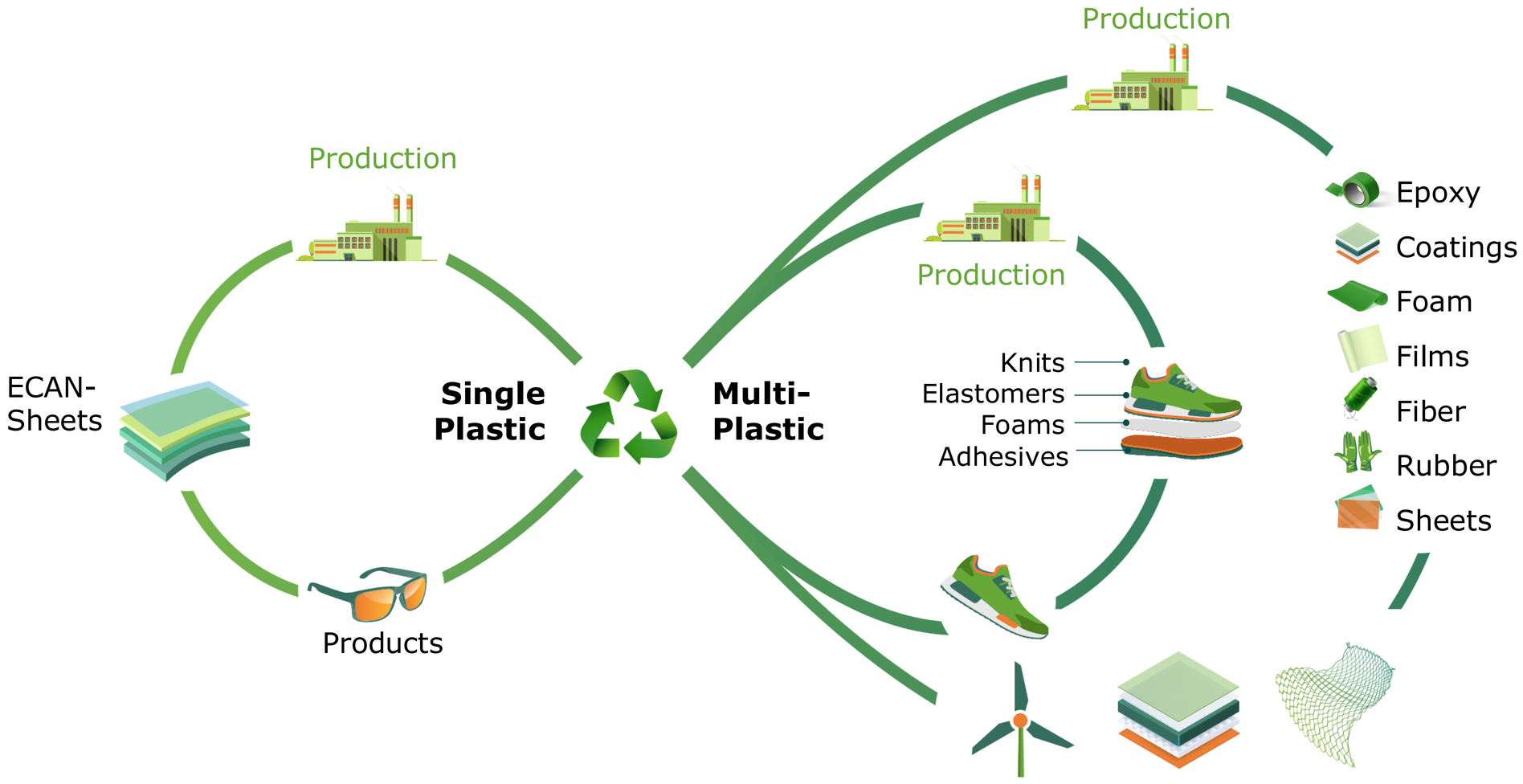
FLO's **tunable and recyclable platform** enables circular products

FLO closes the loop on production and recycling

FLO can manufacture products of different form factors that feeds into another product of equal or higher value



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PLUG AND PLAY

SV SUMMIT

FIRESIDE CHAT



Gloria Chyr

Ventures Associate

Plug and Play



Linnea Whitney Skierski

Director of Policy Implementation, California State Lead

The Recycling Partnership

#PNPTCSiliconValley

Join us at **pnptc.com**

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STARTUP PRESENTATION

Intropic Materials Corporation

Making self-degrading plastics, cleaner chemical manufacturing processes, and so much more

#PNPTCSiliconValley

Join us at pnptc.com

INTROPIC MATERIALS

Enabling enzymes to cost-effectively make and break down chemicals and materials

plastics are not going away, they’re building up in our babies and brains



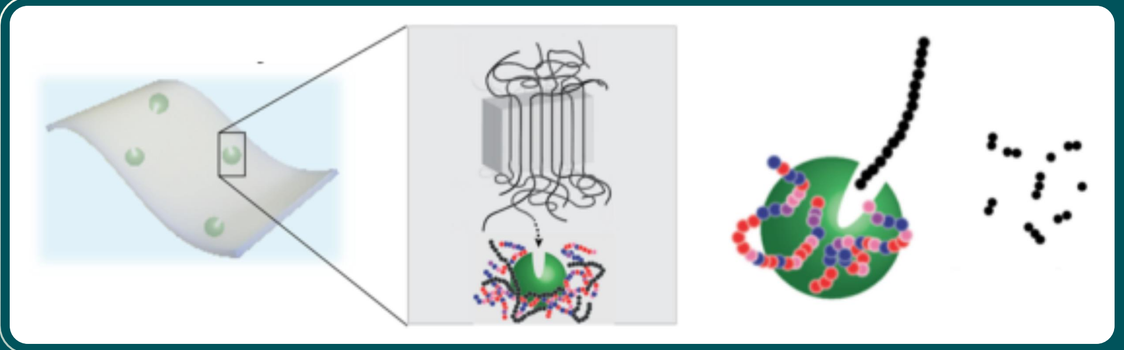
NATURE HAS THE TOOLS, WE MAKE THEM USABLE



Intropic Materials enables Mother Nature’s most powerful tools, enzymes, to solve the fundamental tension between cost, performance, and end-of-life

OUR COST-EFFECTIVE, SCALABLE SOLUTION FOR PLASTIC

ENZYMATIC SELF-DEGRADATION

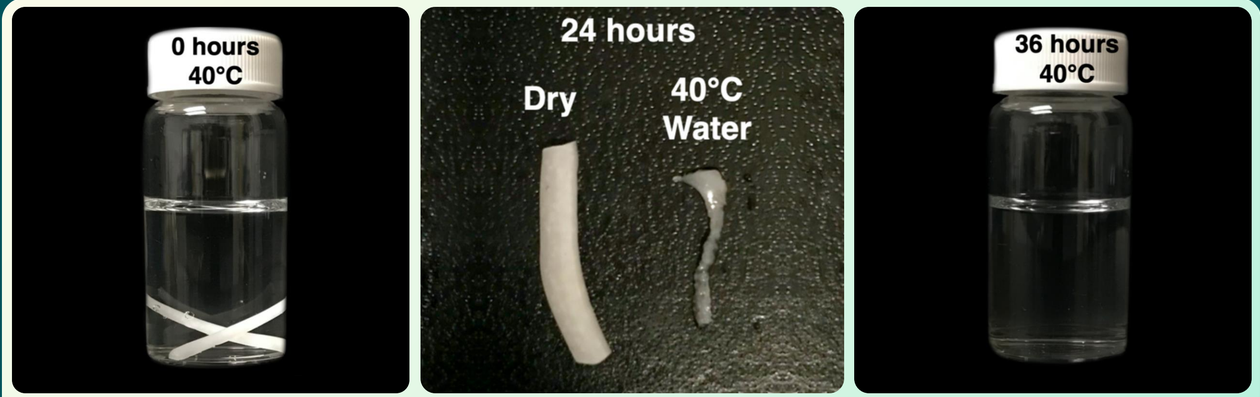


Days to Weeks

With just 1% or less of our enzyme-based additives, plastics rapidly degrade within days, without producing microplastics. The additives are drop-in for existing infrastructure.

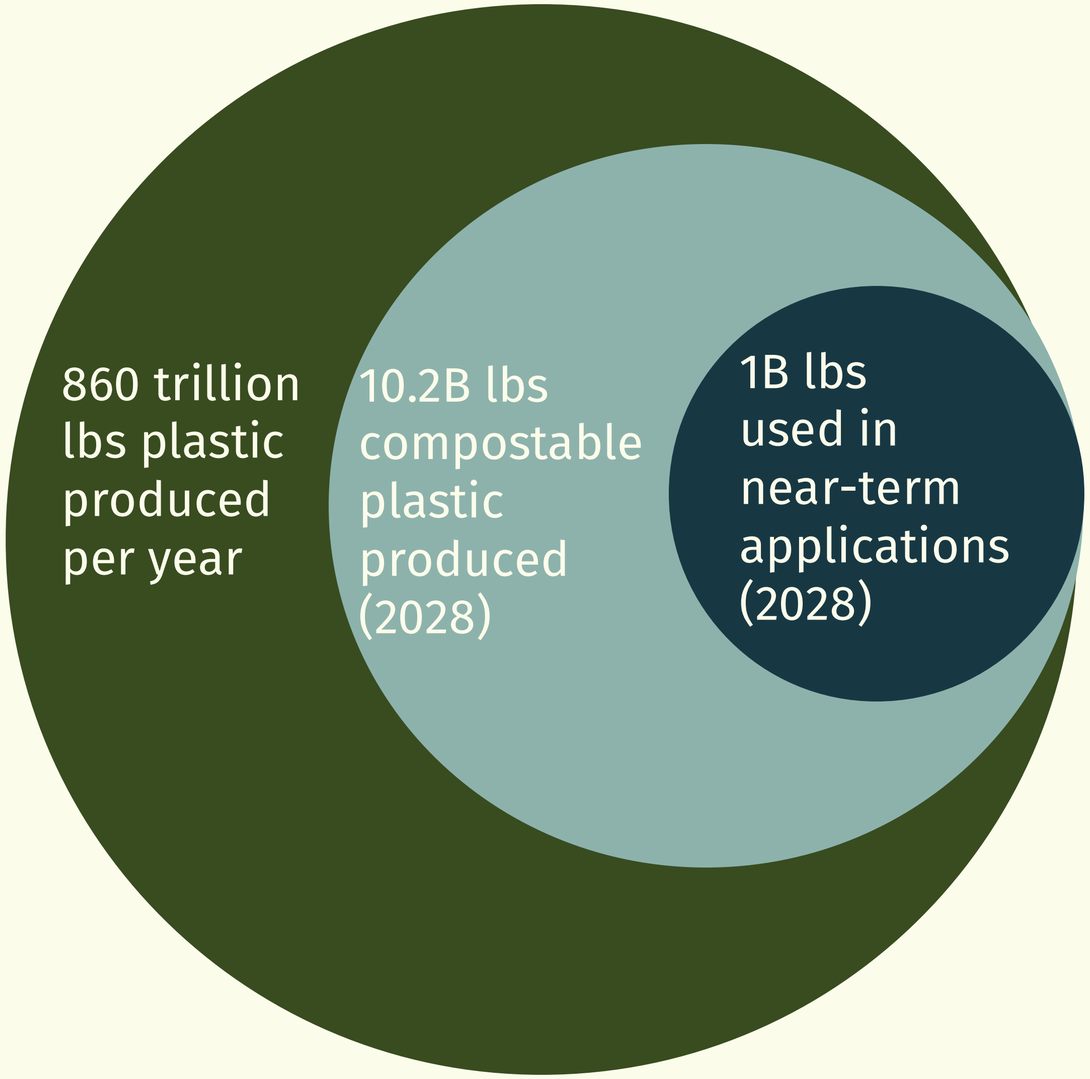


6 DAYS IN COMPOST



36 HOURS IN WARM WATER

COMPOSTABLE PLASTIC MARKET OPPORTUNITY



$2.04B SOM

Assumption:
Intropic sells at **$20** per pound of additive (1% usage level)
$100M ARR / $20 per sale = 5M lbs sold

United Nations Environment Programme (UNEP)
european-bioplastics.org

KEY TRACTION IN PAST 60 DAYS

+3 Paid Customer Pilots Signed

1 Delivered ahead of schedule

4 More in Near-Term Pipeline

+2 Strategic Partner Projects In-Development

1 Patent Filed, 1 Patent Granted



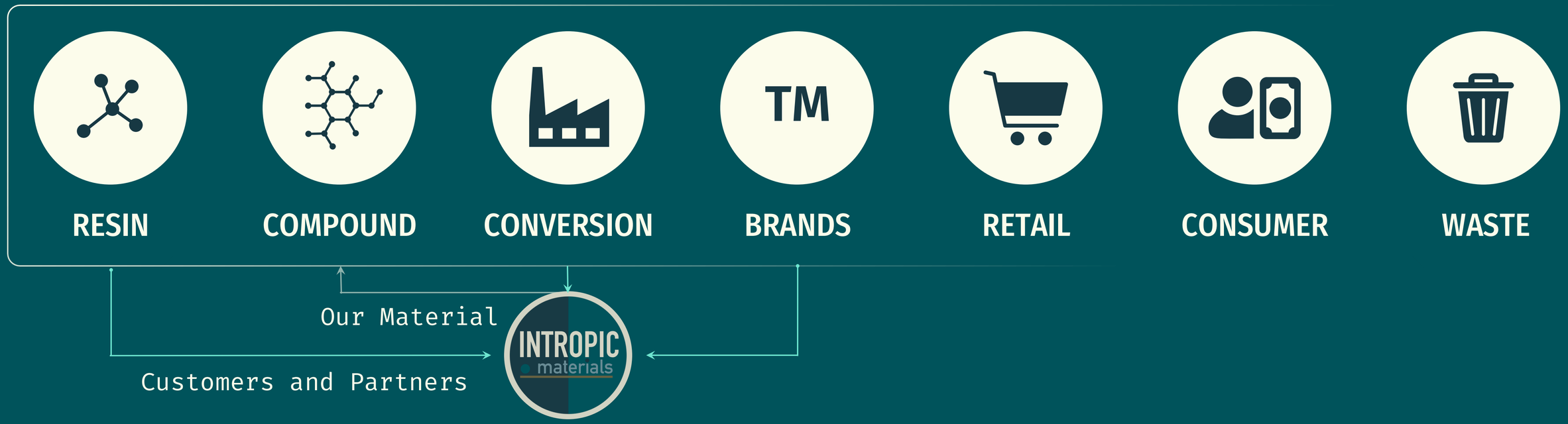
BUSINESS MODEL AND VALUE CHAIN

Our Production

We design and pilot produce in-house, and scale manufacture using CMOs. This lowers CapEx needs, and streamlines global growth.

Our Customers

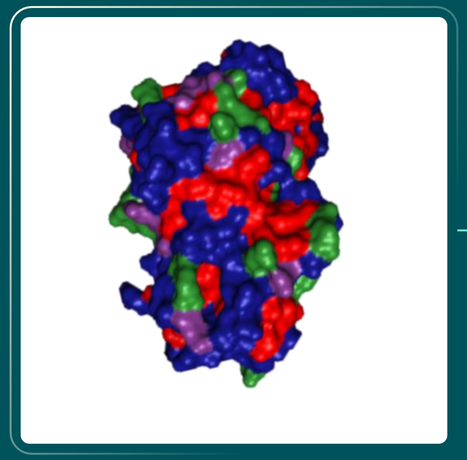
Sell to existing players via standard distribution, and co-develop solutions with partners that address their specific needs.



HOW WE BEAT THE COMPETITION

INTROPIC materials	The Competition
Published in world’s best academic journals	Mostly shoddy, unproven claims
Usage level of 1% or less, preserves product	5-40% usage level, requires complete redesign
Readily scalable in existing infrastructure	FOAK plants and/or massive scale up needed
Platform enables wide range of resins to degrade	Limited selection of degradable resins
Inexpensive with overall cost-savings potential	50-200+% Cost Increase + backend costs

OUR VERSATILE PLATFORM TECHNOLOGY

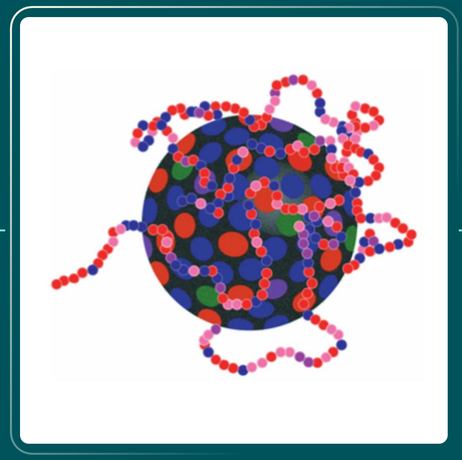


FRAGILE

AI MODEL

MAKE

TEST



STABLE



SOLVENTS AND SOLUTIONS



MATERIAL MANUFACTURING

Our Nanoprotectants stabilize any enzyme, for your applications

3 Granted Patents, 13 Pending Globally

Proprietary IM.AI Model and Datasets

Deep Domain Expertise (4 PhDs, >10 Yrs Exp)

1st Mover Advantage

MARKETS WE SERVE



PLASTICS - $625B



BIOMED+PHARMA – $1T+



FINE CHEMICALS - $641B

Enzymes already deliver multi-billion dollar value, and we expand that by solving their key pain point, stability.

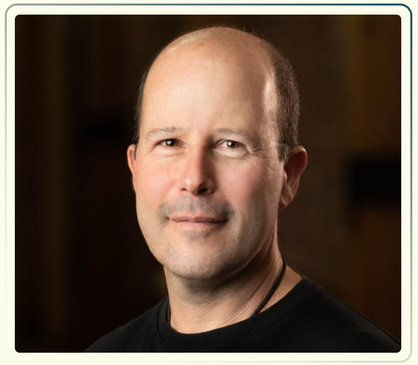
INTROPIC MATERIALS' TEAM

The experience and expertise needed to build the next massive biotechnology company



Aaron Hall PhD
CEO, Founder

15+ years developing and commercializing sustainable chem, biotech, plastic, and food, interdisciplinary leader



Adam Safir PhD
COO

25+ years in early-thru-late stage startups running R&D, Ops, People and Project Management.



Jolene Mattson
Head Process Eng

Scaled production of milk from plants, diamonds from dirt, and perfumes from fermentation. 13 years exp.



Marco Eres PhD
Research Chemist

Designing, modeling, and producing enzyme- and polymer-systems and applications for past 9 years.



Jennifer Imbrogno PhD
Polymer Scientist

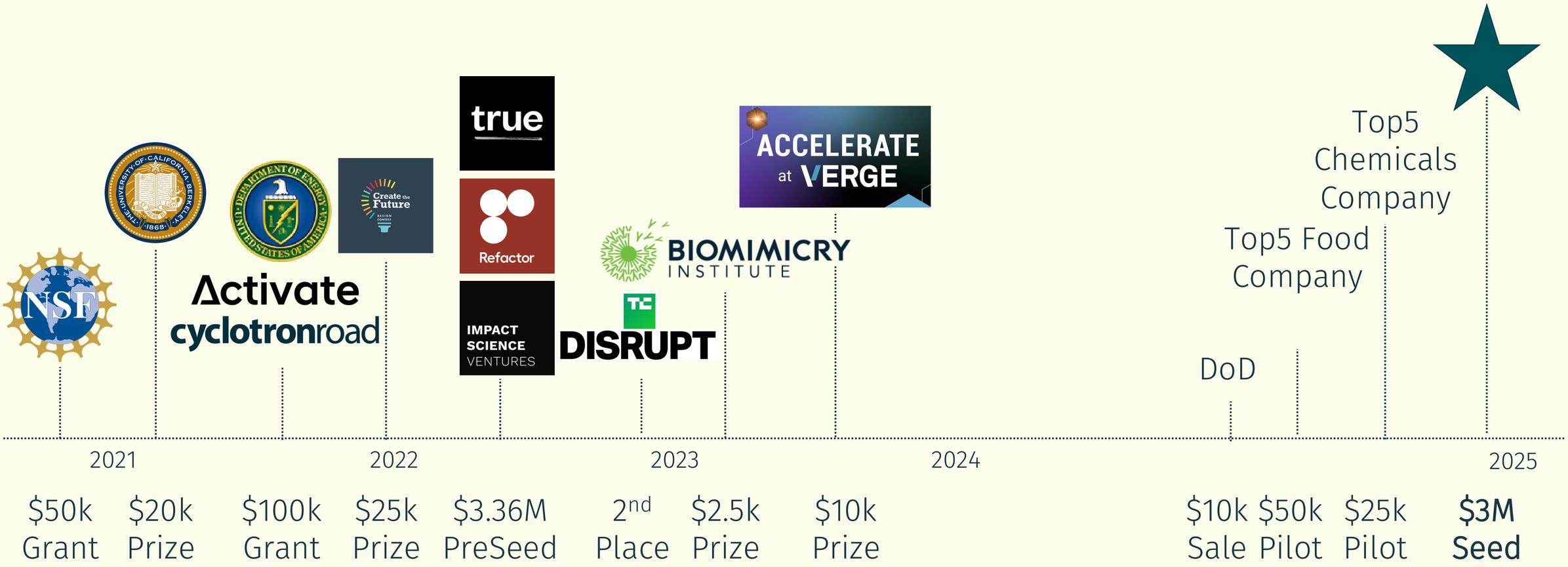
11 years exp. engineering and optimizing of polymer processing in-house and with external partners.



Rodolfo Orellana
Analytical Chemist

Chemical physics, mathematics, and coding expertise with extensive experience running analytics.
7 years in

OUR FUNDING AND CUSTOMER PROGRESS TIMELINE



THE ASKS

VC/CVC/Angel - $3M SEED ROUND

- Bring 5 Paid Pilots through to Commercialization with Partners
- Grow Business Team to Support Customer Discovery, Acquisition, and Service
- Expand Core Technology to Enable Expanded Resins and Accelerate Solution Delivery

CUSTOMER ENGAGEMENT

- Compostable and Biodegradable Plastic Product (Industrial, Home, Soil)
- Enzymatic Biocatalysis / Cell Free Synthesis Enhance Bottom Line or Drive Innovation
- Improved Enzyme Stability (Thermal, Chemical, Shelf-Life

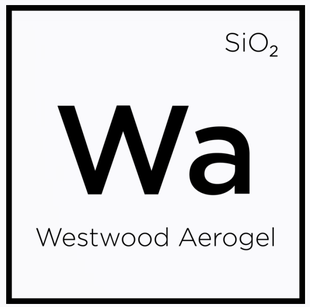
Aaron Hall PhD
CEO & Founder

aaronhall@intropicmaterials.com
https://intropicmaterials.com/

PLUG AND PLAY

SV SUMMIT

STARTUP PRESENTATION



Westwood Aerogel

We make the most thermally insulating material on earth for temperature control

#PNPTCSiliconValley

Join us at **pnptc.com**



Prepared for Plug and Play Pitch Session

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Executive Summary

Why aerogel? Aerogel is an ultra-light, highly porous material known for its superior insulation and low density used in thermal insulation, space exploration, energy-efficient buildings, and battery protection.

Challenges: Aerogel is brittle and expensive to produce, limiting its applications.

Opportunity: Westwood Aerogel is the first in the industry to make aerospace-grade insulation affordable.

Our goal: Demonstrate best in class insulation performance in a no hassle easy to install form factor.



Westwood Aerogel Sample

How to turn aerogel into next-generation insulation:

Step 1: scalably and sustainably produce insulating aerogel particles



Step 2: integrate aerogel particles into an insulating substrate



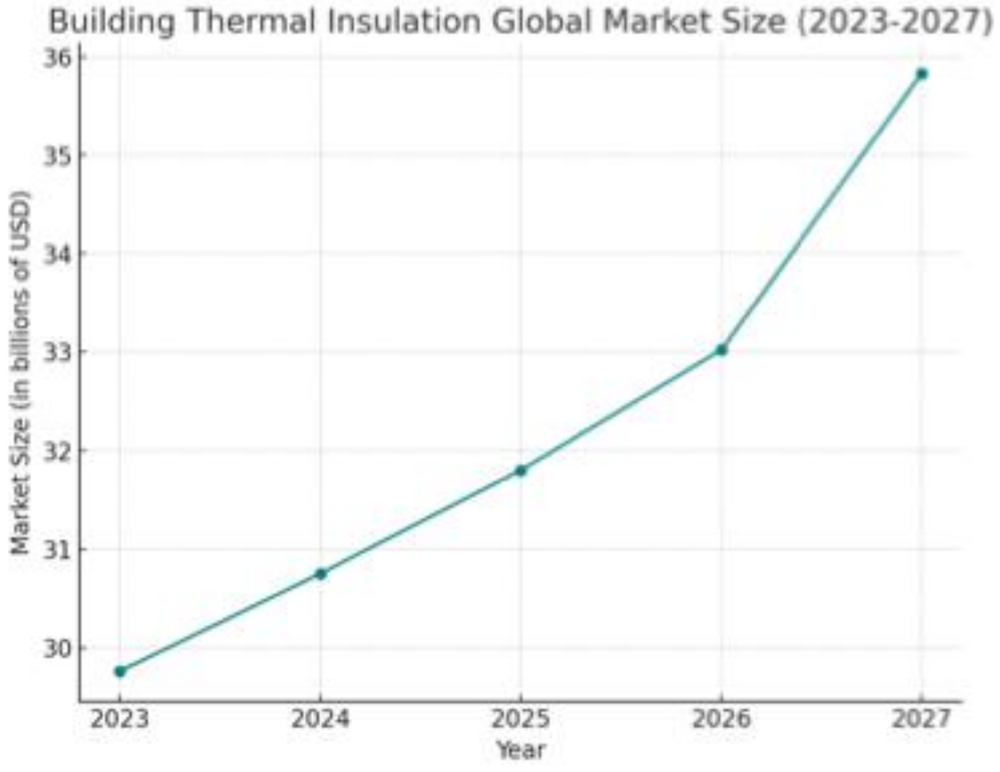
Step 3: install wherever you use insulation for superior energy efficiency and savings



ZERTHERM®

Aerogel insulation should be ubiquitous

- The global building insulation TAM was $30B in 2023.
- US is growing 2x the global rate with a CAGR of 7.5%.



Source: The Business Research Company (2023)









Conventional aerogel are expensive because production methods fail to scale.

Conventional aerogel manufacturing:
- Specialized cylindrical pressure chambers
- Long periods of heat and pressure to dry aerogel
- High upfront labor, energy costs; emissions

Cause	Effect
Specialized equipment	High capex
Batch processing	Poor economies of scale
Specialized processes	High labor costs
High-heat drying	High emissions and energy costs



Conventional supercritical drying chamber

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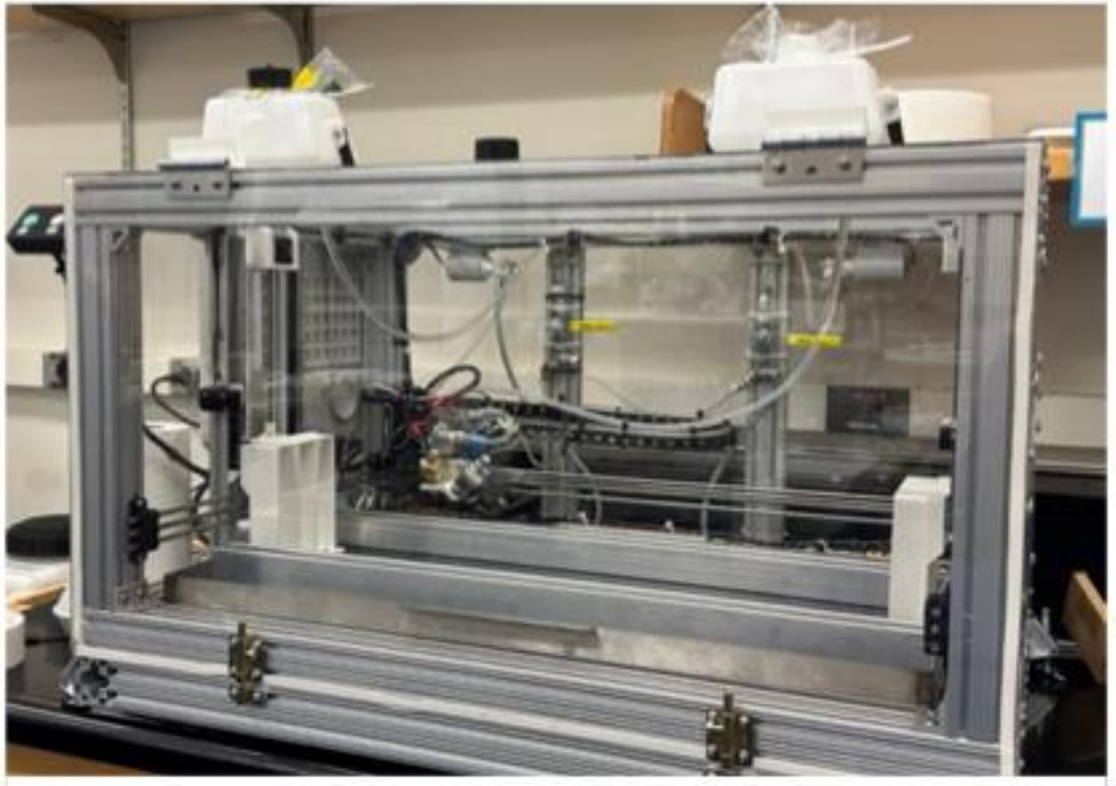
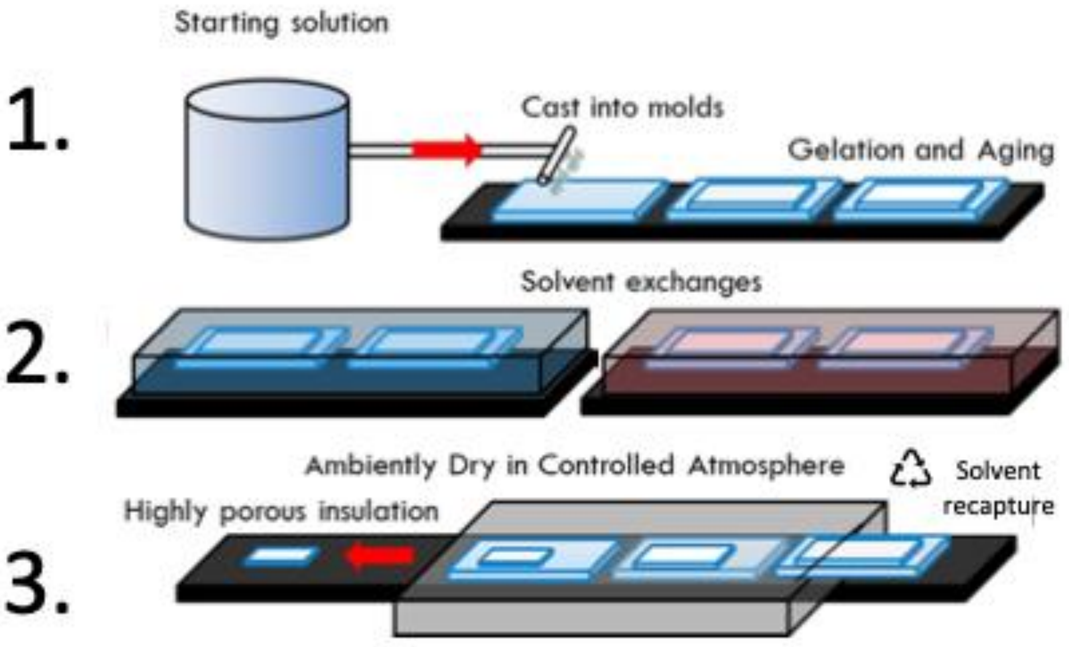
Our proprietary process cuts costs, emissions and production time, making aerogels scalable and affordable



3D aerogel print station built with support from 2023 CalSEED Concept Award



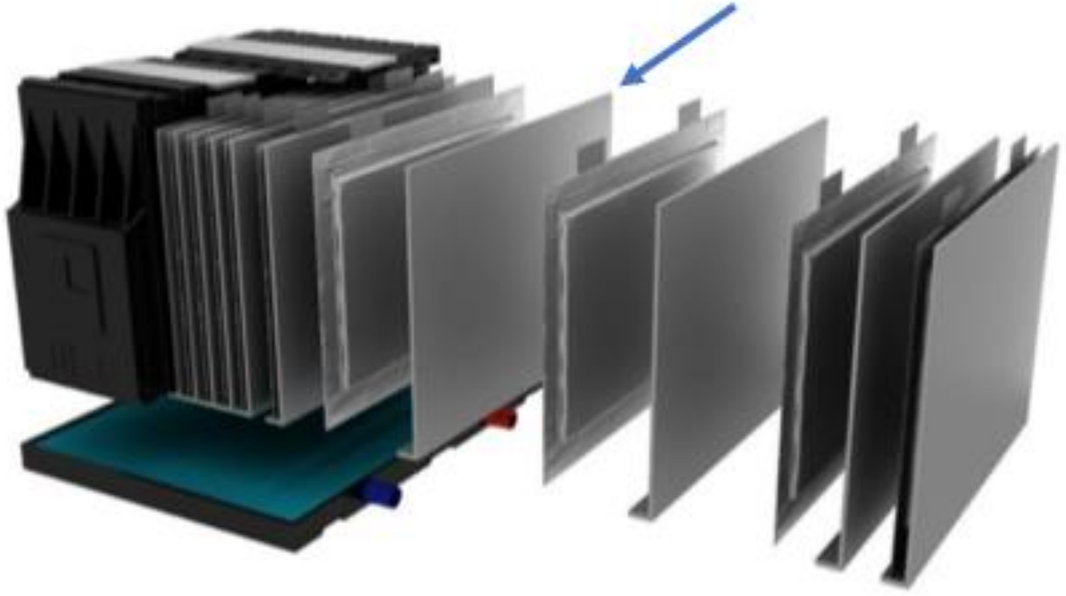
Goal: scalable, sustainable and continuous process using off-the-shelf equipment

Currently being used in EV Battery Packs

Poor thermal management = pack failure



Aerogel is a well-known material for cell-to-cell thermal barriers



ZeroTherm Product Pipeline

1. Westwood Aerogel produces aerogel powder







2. Contract manufacturer integrates powder with insulating substrate



3. EV battery manufacturer integrates ZERTHERM



Every EV battery needs insulation.
Imagine making a sale on each one.



Passenger Sedan
Battery capacity: 68kWh
$2.50 / kWh = $170

TOYOTA

gm

Brand currently using aerogel in EV batteries

Serviceable addressable market for aerogel in passenger sedans through 2030

Year	2025	2026	2027	2028	2029	2030
Compatible electric vehicles[1]	11.5M	13.5M	14.5M	16.5M	19M	22M
Serviceable addressable market	**$1.9B**	**$2.3B**	**$2.5B**	**$2.8B**	**$3.2B**	**$3.8B**

[1] 2023 IEA Global EV Outlook adjusted to account for manufacturers using ZeroTherm compatible prismatic and pouch cells (~70%)

Industry experts for a strategic and effective team



Chief Executive Officer:
Patricia McNeil UCLA

NSG GROUP
INFEWS



Chief Operating Officer:
Daniel Farzannekou UCLA



Lead Scientist:
Oscar Huang

TEXAS A&M UNIVERSITY



Bruce Dunn
Prof. at UCLA

MILLIBATT
BATTERY STREAK® CHARGE LIGHTNING FAST



DC Palter
ClimateTech Startup Investor

TCA VENTURE GROUP
Chemical Angel Network



Frederick Hadidi
IP Expert

TURNER BOYD SERAPHINE

Core team supported by:

Research Partners









Financial Partners











Government Partners









2 Year Roadmap

Q1 2025

- Finalize mechanical designs for solvent exchange and drying systems.
- Begin developing aerogel-based insulation.

Q2 2025

- Integrate gelation, solvent exchange, and drying systems.
- Identify key partners and recruit 1-2 summer interns.

Q3 2025

- Demonstrate integrated aerogel production line.
- Attend trade shows to build brand and introduce product.

Q4 2025

- Refine user interface for automated systems.
- Optimize aerogel insulation formulation.
- Open fundraising round

Q1 2026

- Secure supply chain partnerships.
- Increase aerogel output by 10x.

Q2 2026

- Continue building partnerships and iterate MVPs for pilot projects.
- Update TEA based on scale-up insights.

Q3 2026

- Deliver MVPs for pilot projects and generate revenue.
- Attend trade shows and further scale aerogel production.

Q4 2026

- Finalize fundraising and partnership deals.
- Refine and close MVPs for pilot projects.

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Our path to market:

2025 objectives:

1. Scale up manufacturing out of lab
2. Secure strategic pilot partnerships
3. Finalize R&D for aerogel composites
4. Raise seed round

2026 objectives:

1. Begin ZeroTherm deliveries
2. Launch new aerogel composites
3. Expand strategic relationships
4. On track for cash flow positive 2027

Round:	Raised + grants:
Seed	$945k
$ amount:	Valuation:
Inquire	Inquire

"Westwood Aerogel has validated and has expert knowledge in an ambient drying process for aerogel insulation in a lab environment and is ready for the next phase process scale-up."

Chung Bothwell, MBA, JD, LLM
Strategic Partnerships
Lawrence Livermore National Laboratory

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Contact:

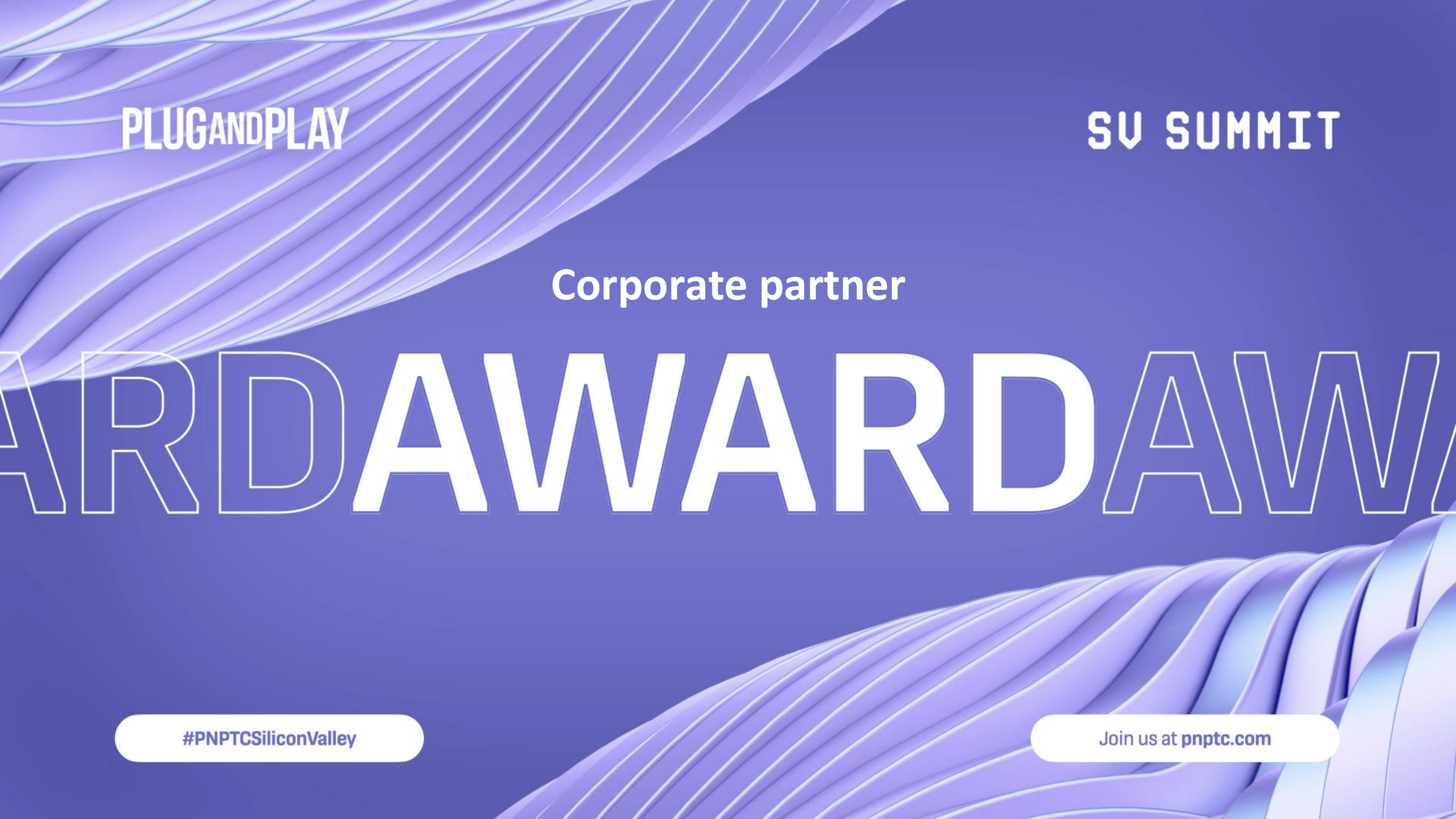
Dr. Patricia McNeil
Chief Executive Officer
e. pemcneil@westwoodaerogel.com

Daniel Farzannekou
Chief Operating Officer
e. dfnekou@westwoodaerogel.com

"Westwood Aerogel has validated and has expert knowledge in an ambient drying process for aerogel insulation in a lab environment and is ready for the next phase process scale-up."

Chung Bothwell, MBA, JD, LLM
Strategic Partnerships
Lawrence Livermore National Laboratory

Lawrence Livermore National Laboratory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Join us at pnptc.com

PLUG AND PLAY

SV SUMMIT

Corporate

AWARD



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THANK YOU FOR ATTENDING

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PLUG AND PLAY

SV SUMMIT

Lunch

#PNPTCSiliconValley

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