AGENDA

University of Connecticut
Board of Trustees

Committee for Research, Entrepreneurship and Innovation
Thursday, April 24, 2025, at 1:00 p.m.
Virtual Meeting

Public Streaming Link (with live captioning upon request): https://ait.uconn.edu/bot

(A recording of the meeting will be posted on the Board website https://boardoftrustees.uconn.eduwithin seven days of the meeting.)

Call to order at **1:00 p.m.**

1. Public Participation*
   *Individuals who wish to speak during the Public Participation portion of the Thursday, April 24, meeting must do so 24 hours in advance of the meeting's start time (i.e., 1:00 p.m. on Wednesday, April 23 by emailing BoardCommittees@uconn.edu. Speaking requests must include a name, telephone number, topic, and affiliation with the University (i.e., student, employee, member of the public). The Committee may limit the entirety of the public comment to a maximum of 30 minutes. As an alternative, individuals may submit written comments via BoardCommittees@uconn.edu, and all comments will be transmitted to the Committee.

2. Minutes from February 13, 2025, Meeting

3. Office of the Vice President for Research Updates – Dr. Pamir Alpay, Vice President for Research, Innovation and Entrepreneurship

4. Presentation by Ryan McMillian, Director of Venture Development, Technology Commercialization Services – Technology Incubation Program (TIP) Overview

5. Presentation by Ryan Gresh, CEO & Founder of The Feel Good Lab & Alexey Melnik, CEO of Arome Science – *Improving Wellness Through Collaboration at UConn TIP*

6. Presentation by Al Kasani, CEO with Co-Founders Steve Tricarico & Shouwang Zhu of Particle N – *Core Shell Technology*

7. University Senate Representative Report

8. Other Business

9. Executive Session (as needed)

10. Adjournment

PLEASE NOTE: *If you are an individual with a disability and require accommodations, please e-mail the Board of Trustees Office at boardoftrustees@uconn.edu prior to the meeting.*

TIP Program

Connecticut’s Premier Hub for
High Growth Startups

UConn Technology Incubation Program (TIP) Overview

A premier hub for high-growth startups, offering direct access to UConn's cutting-edge research and innovation ecosystem.

Connecticut's leading university-affiliated incubator.

1. **State-of-the-Art Facilities & Flexible Leasing**
   Move-in-ready lab and office space, including vivarium/key equipment, designed to support diverse startup needs.

2. **Comprehensive Business & Technical Support**
   Dedicated program team, expert Entrepreneurs-in-Residence (EIRs), and world-class faculty mentors to accelerate growth.

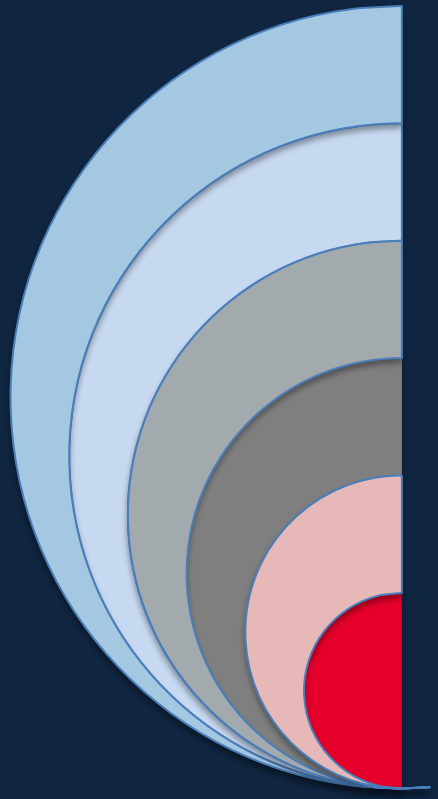
3. **Strategic Funding & Partnership Resources**
   Direct connections to investors, grant-writing support, and curated introductions to legal, regulatory, and business service providers.

UConn TIP's collaborative ecosystem connected neighboring start-ups, Arome Science and Feel Good Lab, to sign a distribution agreement leveraging their respective strengths, and know-how

Why TIP Matters: Driving innovation and economic growth in CT.

Technology Incubation Program Selection Process

We seek companies with strong innovation potential, alignment with UConn's strengths, and readiness to thrive in a structured incubation environment



1. **Technology/Innovation**
   Uniqueness, IP position, competitive differentiation
2. **Team Strength**
   Founders' experience, technical/business balance, coachability
3. **Business Potential**
   Market size, customer need, revenue model, scalability
4. **Traction**
   Grants (e.g., SBIR), pilots, LOIs, customer validation
5. **UConn Engagement**
   Collaborations with faculty, use of core facilities, hiring UConn students
6. **Fit with TIP**
   Stage-appropriateness, space/lab needs, ability to benefit from TIP offerings

Technology Incubation Program Process Evolution

The UConn TIP program supports startups through multiple phases of growth, each focused on key milestones and funding strategies

JOIN

- Build strategic plan
- Setup operations
- Grant awards

BUILD

- Build team and advisors
- Market readiness / pivotal studies
- New funding (grants, angels)

GRADUATE

- Capital raise
- Scale up
- Identify new space

GROW

- Connect with investors
- Initial traction / regulatory prep
- Company board

UCONN

Technology Incubation Program Company Information

Fueling innovation and investment: 13 faculty-founded startups and 29 high-growth TIP ventures raising $1M+ in just two years.

Faculty Starts in Last 2 Years

Company Name	*School*
Cometa Therapeutics	CLAS
CF-Neuromedics	Biomedical Eng
Atlantic Sea Solutions	Nutrition
QueHot	Physics
QuaSim	School of Computing
Access Quantum	TCS
Zeal Therapeutics	Pharmacy
Neocine	UConn Health
Soleia BioSciences	UConn Health
Andros	CLAS
Nanomaterials Research LLC	Engineering
Candlewood Biologics	Dental School
Verintas	Physiology and Neurobiology

TIP Companies Raising >$1m

3D Array	EvolveImmune	NourishRX
Allyx	General Biomics	QCDx
Arome	HIE	QMD
Azitra	Imstem	RIGImmune
Bactana	Intus	Sky Squeegee
Bastion	LambaVision	The Feel Good Lab
Carogen	Mitotherapeutix	Thetis
CytoVeris	Mitrix	Thetis
Debogy	Nanoionix	Torigen
Encapsulate	Noteworthy	

The FEELGOOD lab

NATURAL PRODUCTS FOR PEOPLE FED UP
WITH TODAY'S PAIN RELIEF OPTIONS

COMPANY OVERVIEW

THEFEELGOODLAB.COM

America is Losing the War on Chronic Pain

Written by Anna Wahrman with additional reporting by Whitney Akers on November 9, 2017

In the face of an escalating opioid crisis, at least 100 million people with chronic pain aren't getting the relief they need and are seeking alternatives.


#1 CLINICALLY RECOMMENDED
ULTRA STRENGTH
BENGAY
PAIN RELIEVING CREAM
ODOR FREE THERAPY
Aspercreme
BIOFREEZE
GEL
ICY HOT
PAIN RELIEVING CREAM


The
FEEL
GOOD
lab


The FEELGOOD lab
NATURAL PAIN CREAM
FOR ARTHRITIS, BACK PAIN, SORE MUSCLES & JOINTS
30 HANDPICKED INGREDIENTS
100% NATURAL
PAIN RELIEVING CREAM
100ml / 3.4 fl. oz.
The FEELGOOD lab
SPORT RECOVERY LOTION
FOR MUSCLE SORENESS
POST-TRAINING FORMULA
100% NATURAL
PAIN RELIEVING LOTION
100ml / 3.4 fl. oz.

PLANT-BASED PAIN RELIEF THAT *actually* WORKS

- NATURAL FORMULA
- FDA-REGISTERED
- SAFE FOR CHILDREN 2+
- NO LINGERING SMELL
- MONEY-BACK GUARANTEE

FEEL GOOD ABOUT EVERY INGREDIENT


ARNICA


TURMERIC


GLUCOSAMINE


CALENDULA


MAGNESIUM


MENTHOL


CHONDROITIN


COCONUT OIL


ALOE VERA


MSM


BOSWELLIA


SUNFLOWER OIL


DEVIL'S CLAW

CMO


AND MORE

OUR NØ LIST

- PETROCHEMICALS
- ALCOHOL
- PHTHALATES
- PARABENS
- PEG COMPOUNDS
- SILICONES
- FORMALDEHYDE
- FRAGRANCES
- HORMONE DISRUPTERS

AMAZON'S #1 NATURAL PAIN CREAM

50MM+ EARNED IMPRESSIONS IN LAST 6 MONTHS

★★★★★

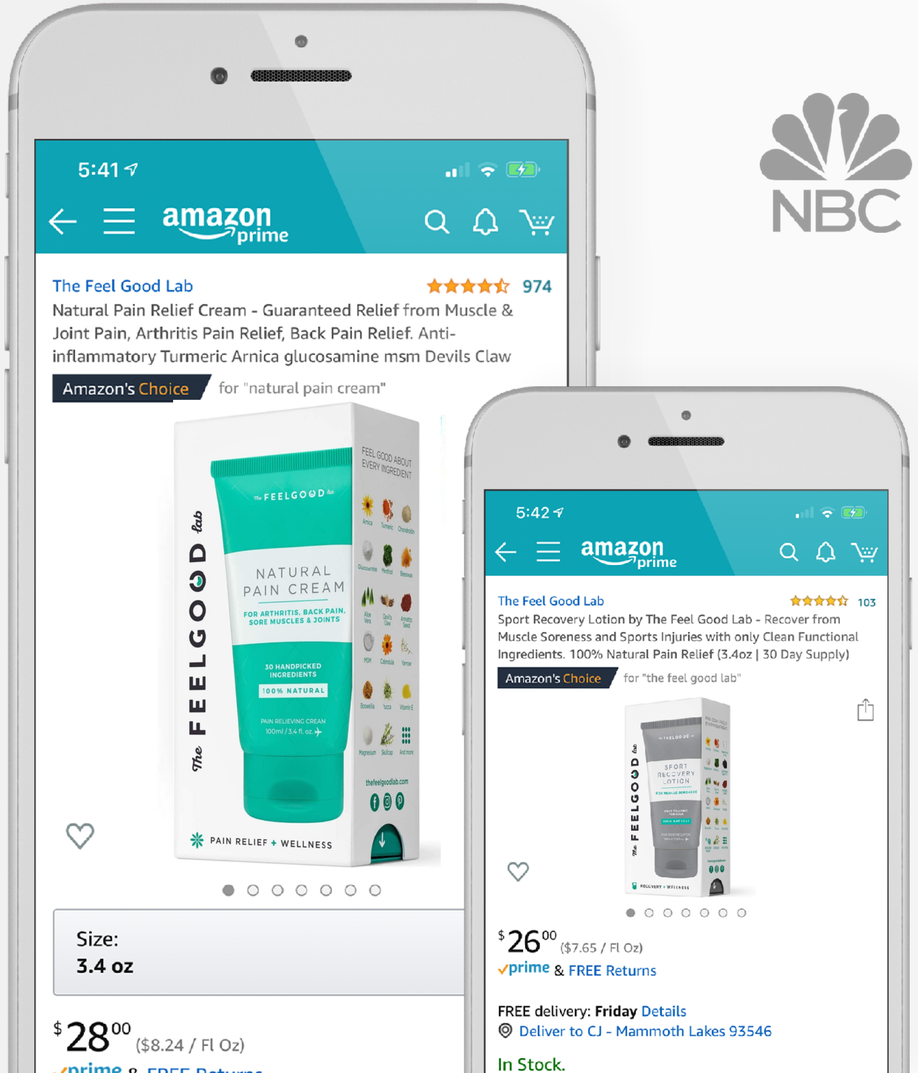
The product helps a lot. I'm glad it's such a clean topical product! Definitely worth the money! Do it!

Verified Amazon Review
May 2019

★★★★★

The product is all natural, no hidden ingredients. Goes on smoothly, and absorbs quickly with no after smell. I love, love, love this product. It is a great value for the price, and best of all, it works!

Verified Amazon Review
July 2022



FEATURED BY

SHAPE — 2.6MM+ CIRC.

abcNEWS — 317K+ UVPM

KTLA 5 — 3.1MM+ UVPM

NBC

Entrepreneur — 16.2MM+ UVPM

CBS — 1.5MM+ UVPM

FOX NEWS

Bloomberg — 23.1MM+ UVPM

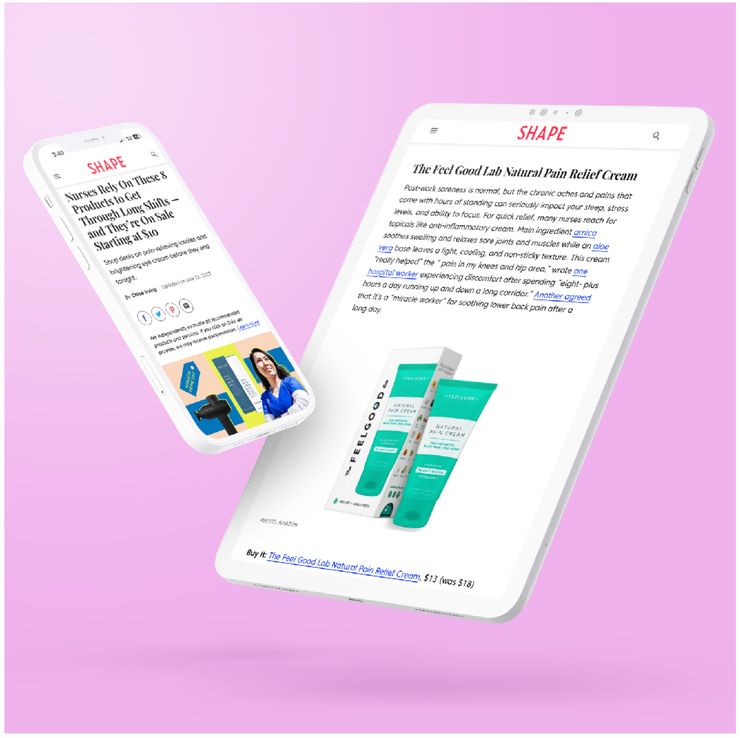
Arthritis Foundation

BUSTLE — 16.3MM+ UVPM

BEST PRODUCTS — 610K+ UVPM

Hartford Courant — 2.1MM+ UVPM

"It seems fitting that fans of the stuff have described it as a "magic cream." Runner's World test editor Amanda Ferrer says she keeps it on her nightstand drawer in case muscle soreness crops up on her neck, shoulders, feet or ankles. "It instantly has that cooling effect - and the smell is more subtly menthol," she says."



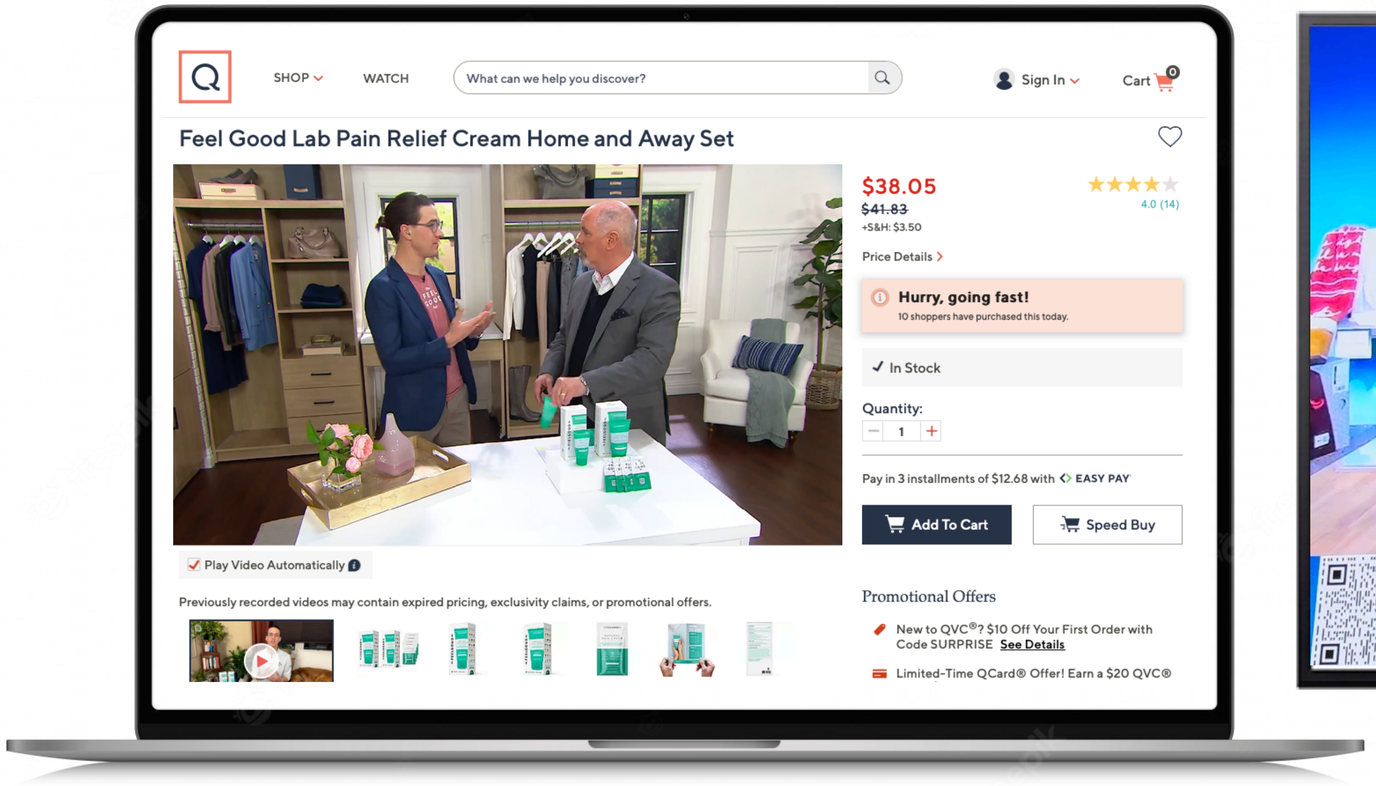
TRUSTED BY CHAMPIONS

From Extreme Sports to CrossFit World Champions to Professional Athletes, we fuel some of the best athletes on the planet.

NATIONAL MEDIA SUCCESS

QVC

GOOD MORNING AMERICA



WHATS NEXT

Build *the* modern pain relief brand for today's consumer

Fight pain with wellness.™

Inflammation

Fish Oil

Vitamin D

Hydration

FOOD INFLAMMATION TEST

BY THE FEEL GOOD LAB

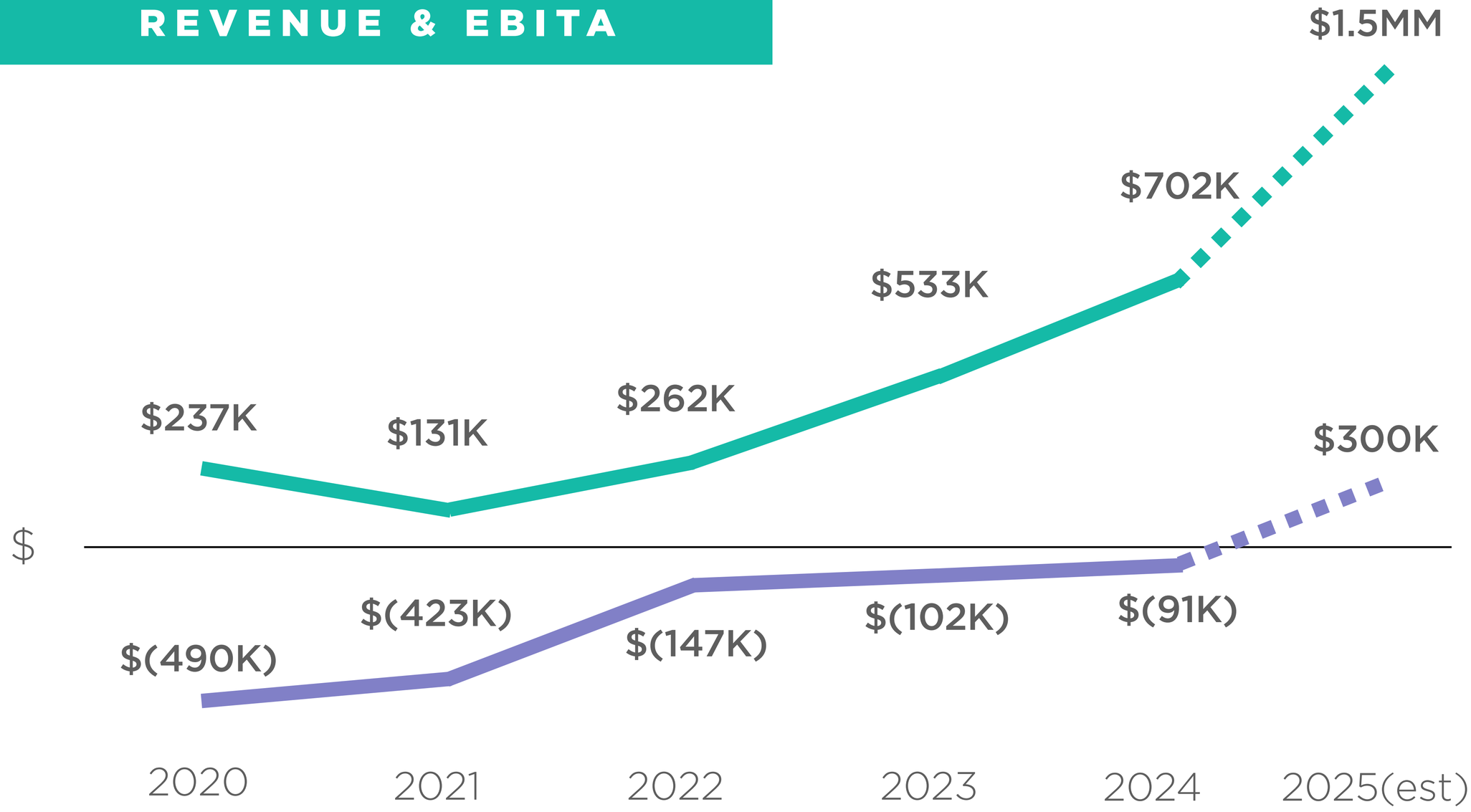
This simple at-home test measures which foods are causing inflammation in *your* body, allowing you to create a fully personalized diet. Reducing out-of-control inflammation allows the body to function more optimally, reducing symptoms and improving recovery and performance.

- **CUSTOM REPORT**
- **AT-HOME FINGER PRICK**
- **LAB RESULTS IN 10 DAYS**
- **MEASURES UP TO 176 FOODS**
- **TESTS FOR LEAKY GUT**
- **MORE ACCURATE THAN FOOD SENSITIVITY**

176 Foods

+ Leaky Gut

REVENUE & EBITA




TIP UPDATE

November 26, 2024

Robotic Lab at TIP

Gut Health Score

The gut microbiome is composed of trillions of bacteria that play a crucial role in your digestion, immune support, and energy production. This test measures how well those bacteria are producing critical Short Chain Fatty Acids (Postbiotics), and what we can do to improve them.

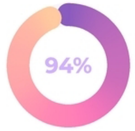
How Your Score Is Calculated

Total SCFA

Vital components produced by our healthy gut bacteria

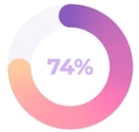
SCFA Ratios

Three main types must be in balance with each other (see page 2)



Toxins

Three main types must be in balance with each other (see page 3)



Stability

Consistency between samples

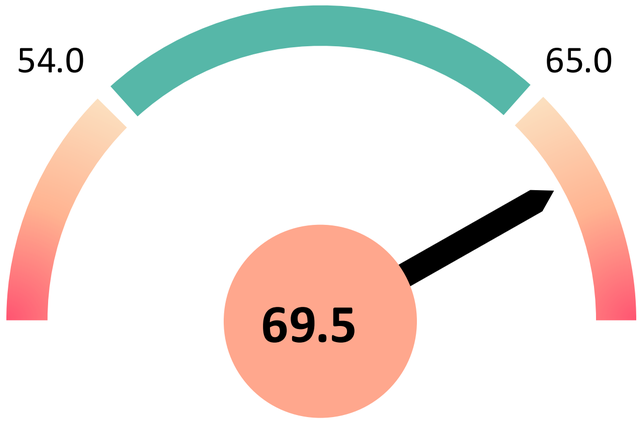
How To Improve Your Gut Health

Your personalized action plan is based on 16 clinical studies that use pre-biotics (soluble fiber) as the input and post-biotics (short chain fatty acids) as the output. By introducing the right type of soluble fiber to your diet, you can improve SCFA production, gut health and overall wellbeing.

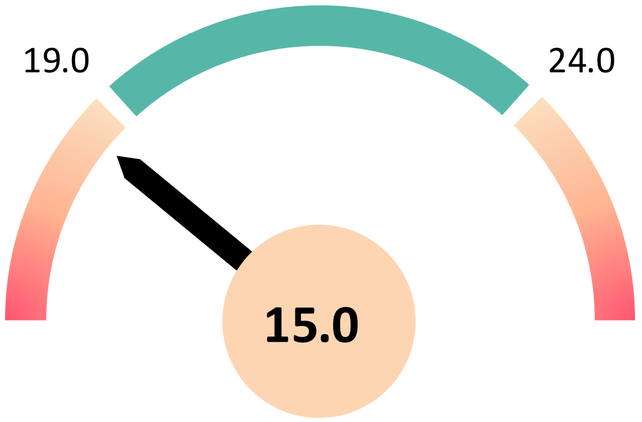
Daily Fiber Recommendation

First Test // 8.19.2024

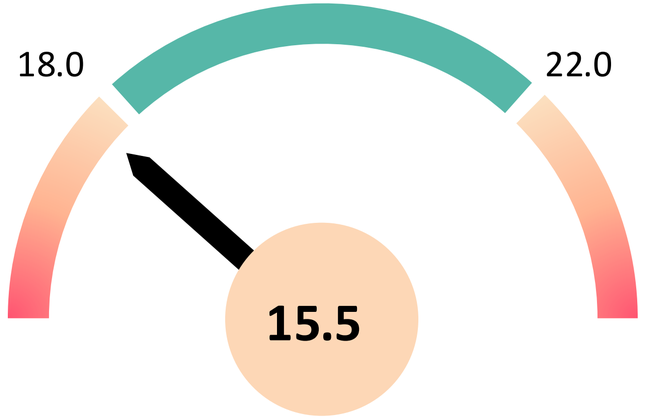
Acetic Acid



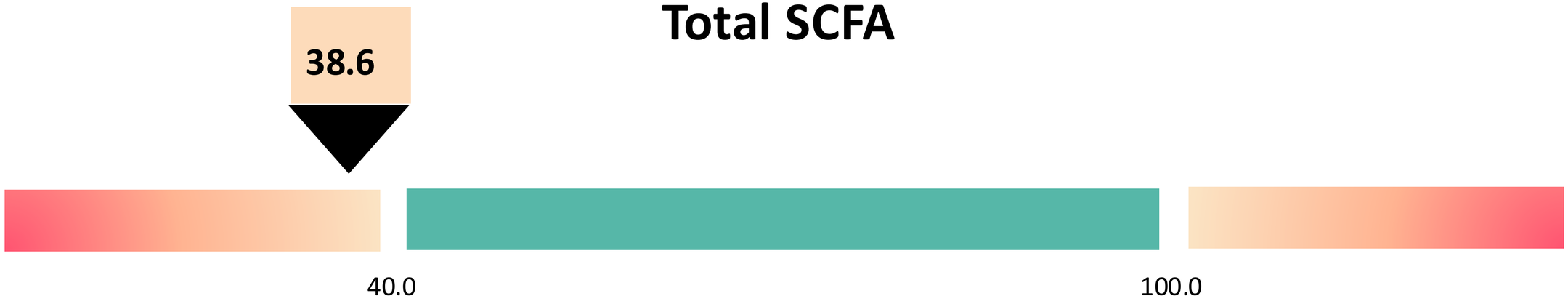
Propionic Acid



Butyric Acid

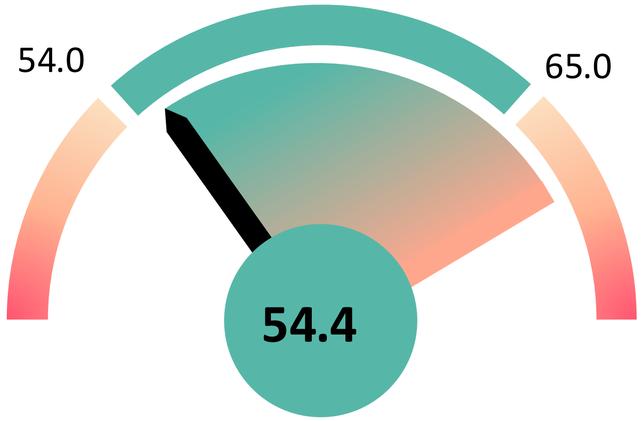


Total SCFA

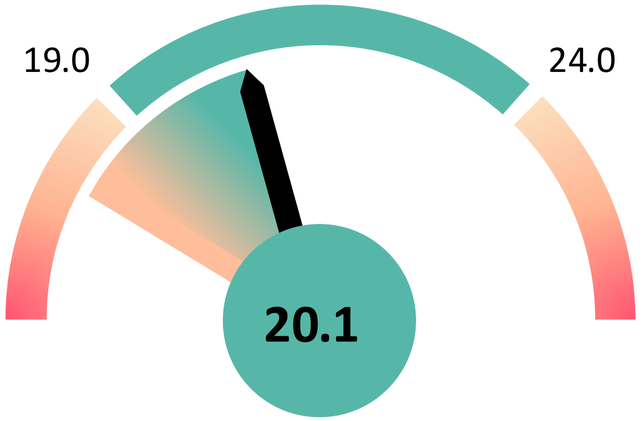


Second Test // 1.15.2025

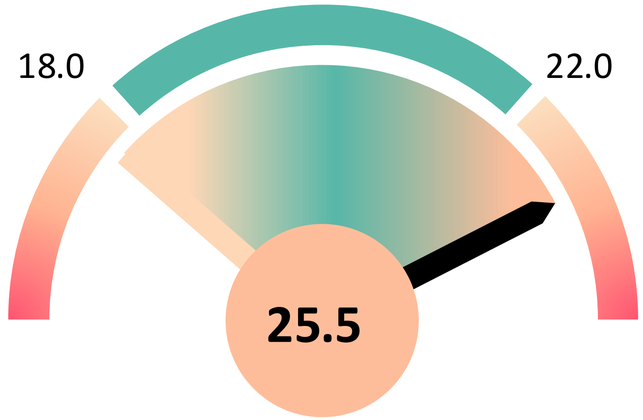
Acetic Acid



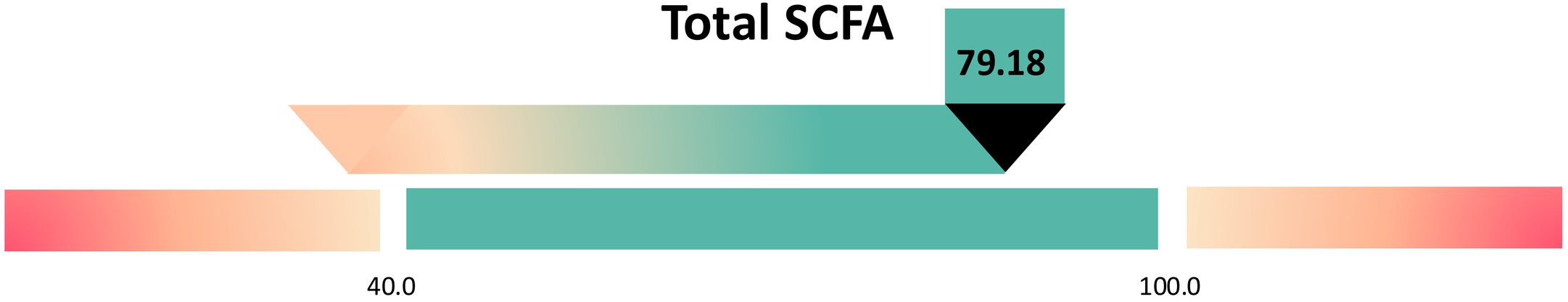
Propionic Acid



Butyric Acid



Total SCFA



THE MOST ACTIONABLE GUT TEST ON THE MARKET

The FEELGOOD lab

TIP Companies Partner to Advance Digestive Health

Neighboring UConn TIP start-ups, Arome Science and Feel Good Lab, sign a distribution agreement leveraging their respective strengths, and know-how

The FEELGOOD lab

FIGHT PAIN WITH WELLNESS™

For more information

RYAN GRESH

CEO & Founder | ryan@thefeelgoodlab.com | 860.930.0133

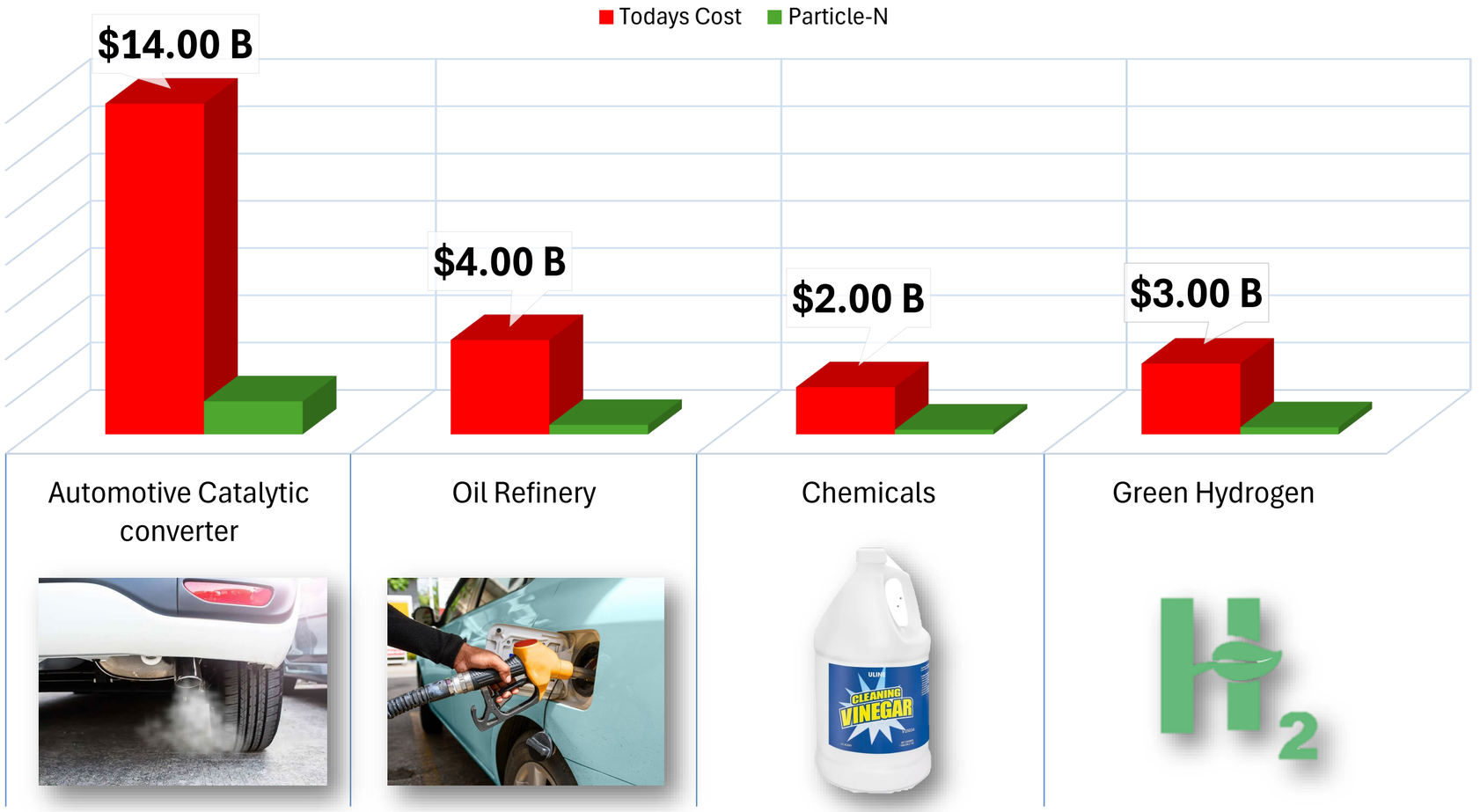
PARTICLE-N

Core-Shell Technology

We reduce precious metal cost for the industry by 90%!

1392 Storrs Rd #107, Storrs, CT 06269

Precious Metal Catalyst Demand by Industries



Sources: Smith et al. Precious Metal Market Outlook 2024-2034 (2023)

Particle-N Core-Shell Technology (patent pending)

Industry Standard Precious Metal

Precious Metal

Particle-N's Precious Metal (Ir,Pt,Ru and more)

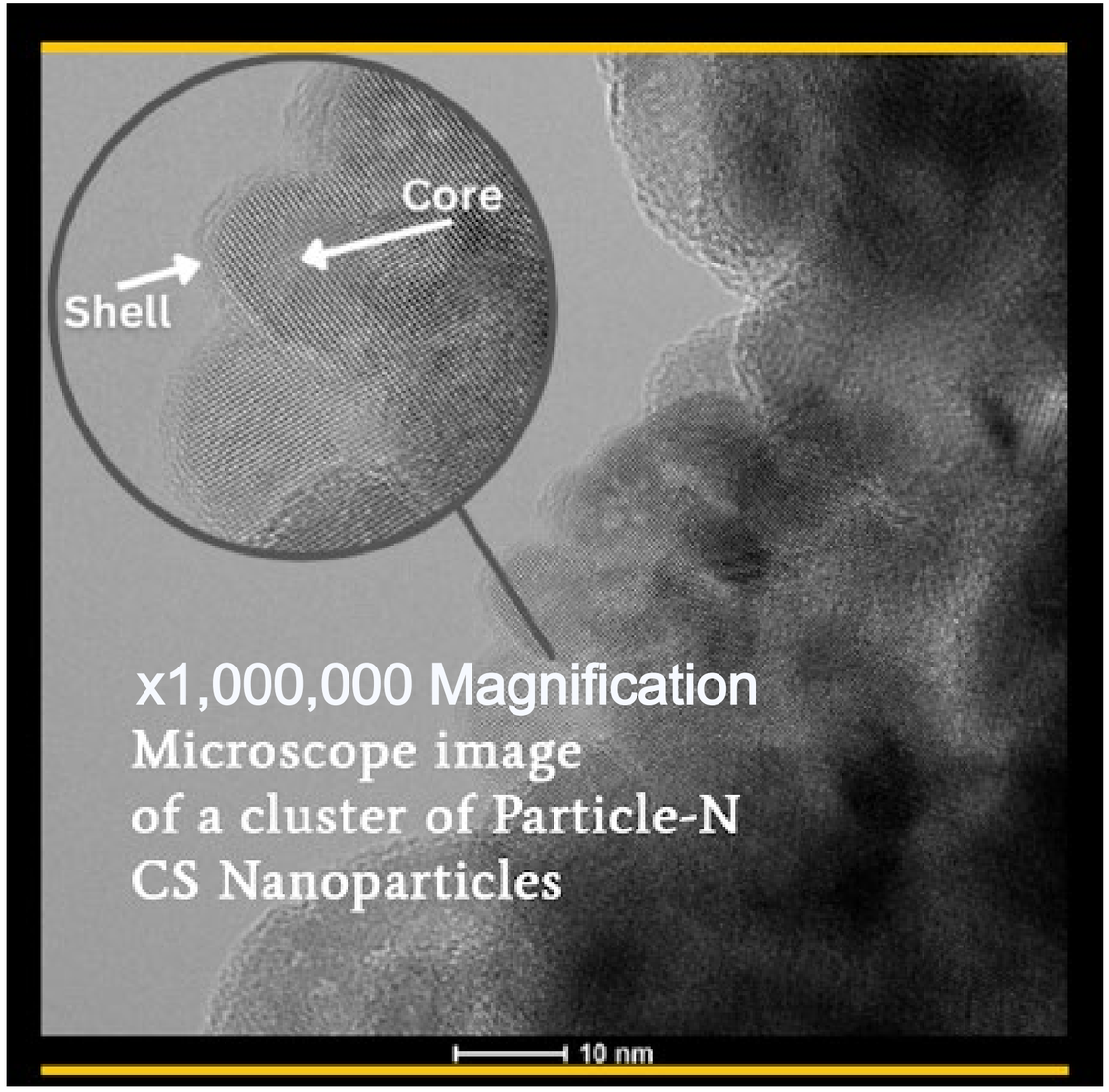
Core: Titanium or Aluminum

~ $5/oz

Shell: Iridium or Platinum or Gold

~$5,000/oz

Filler Material



Particle-N Core-Shell Technology

+8x Less Precious Metal Requirement

For the same job

+90% Cost Savings for Customers

PCT Patent Application:
PCT/US2025/018324

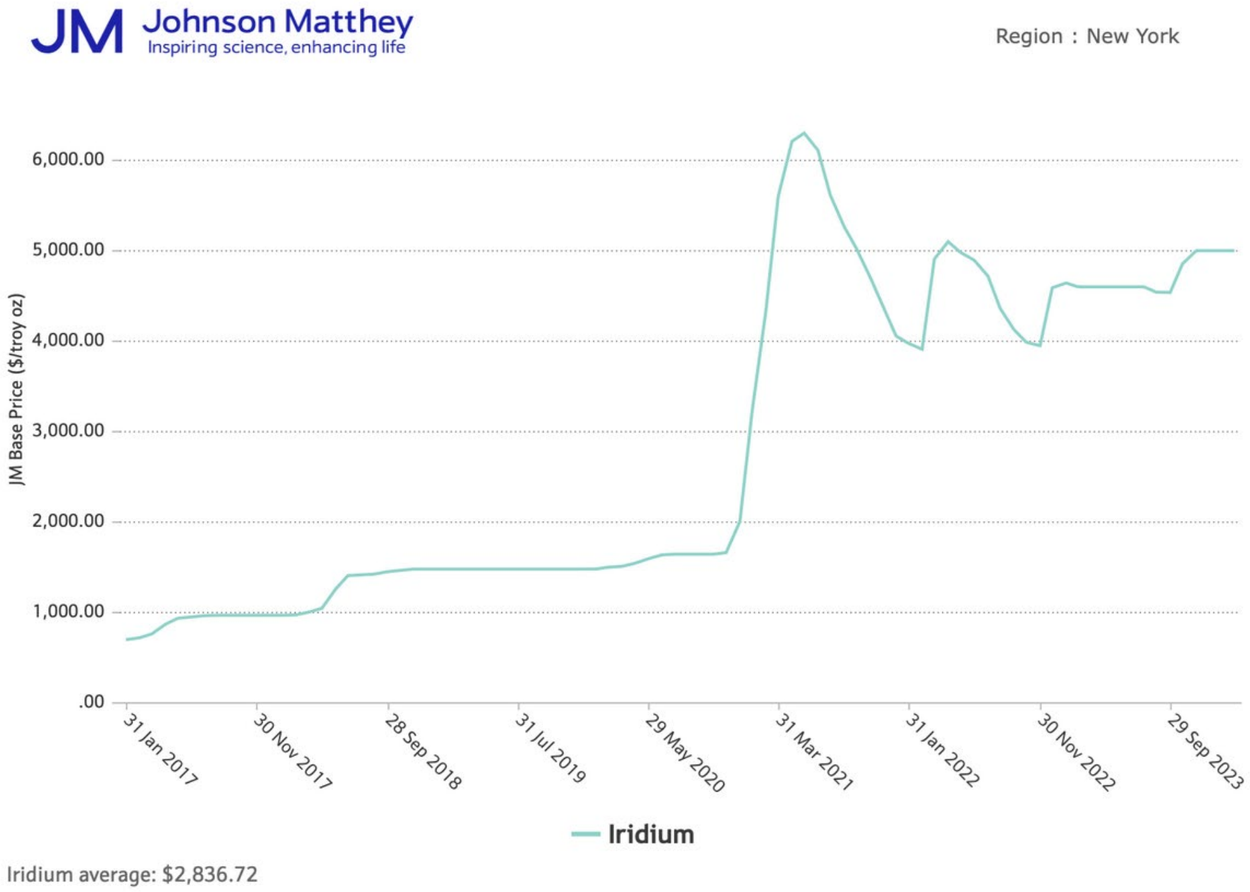
U.S. Vulnerability metrics for Precious Metal Catalysts

We reduce this vulnerability by 90%

Indicator	Platinum	Palladium	Rhodium	Iridium	Ruthenium
HHI – country concentration of operating PGM mines (Monopoly = 10,000)	4873	3160	7275	7023	8470
Geopolitical sensitivity (based on weighted avg. World Bank Regulatory Quality index)	53.9	51.7	55.1	54.9	57.5
U.S. consumption as a percent of global mine production	32%	51%	91%	20%	46%
U.S. net import reliance	79%	40%	100%	100%	100%
Byproduct commodities	No	Yes	Yes	Yes	Yes
Price volatility	$20	$56	$508	$51	$8
Human Development Index 2019 (United States = 0.926)	0.73	0.79	0.71	0.71	0.71
Fraser Institute metric: Investment Attractiveness Index 2020 (United States = 70.51)	58.8	66.3	57.6	56.9	57.0
Environmental Performance Index (United States = 69.3)	45.7	50.4	43.7	43.7	43.5

(Department of Energy, *Platinum Group Metal Catalysts Report*, 2022)

An Iridium Shortage is Here



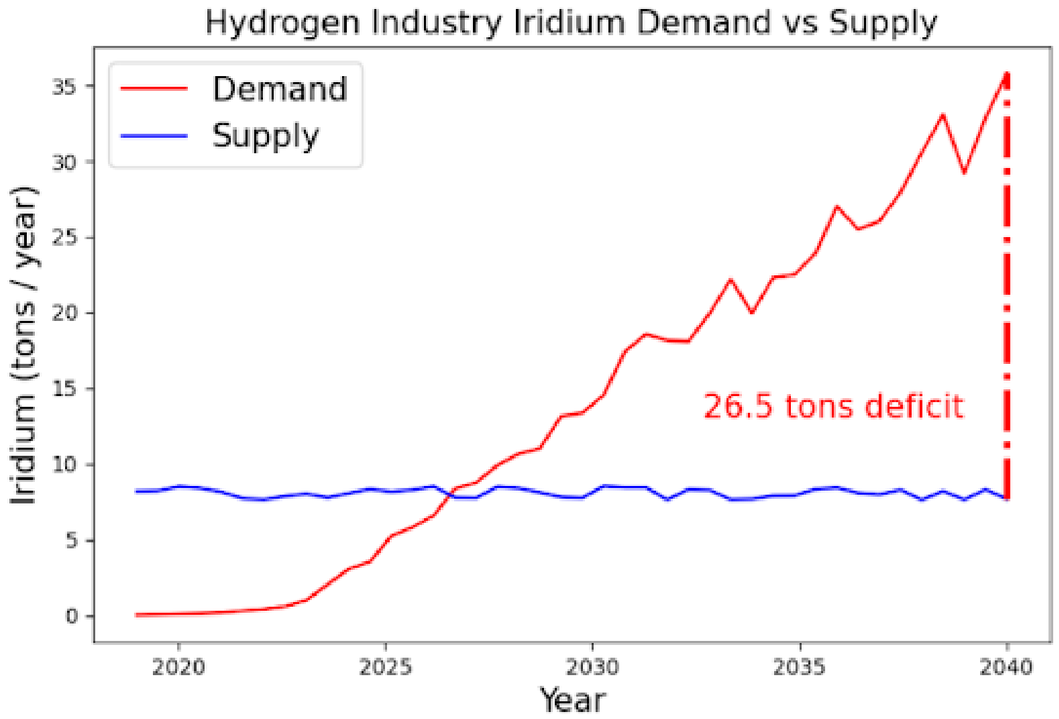
Source: Johnson Matthey Iridium Price History Report

- <9 tons of iridium produced annually
- 3x price increase in 3 years
- 2024: $5000/ounce

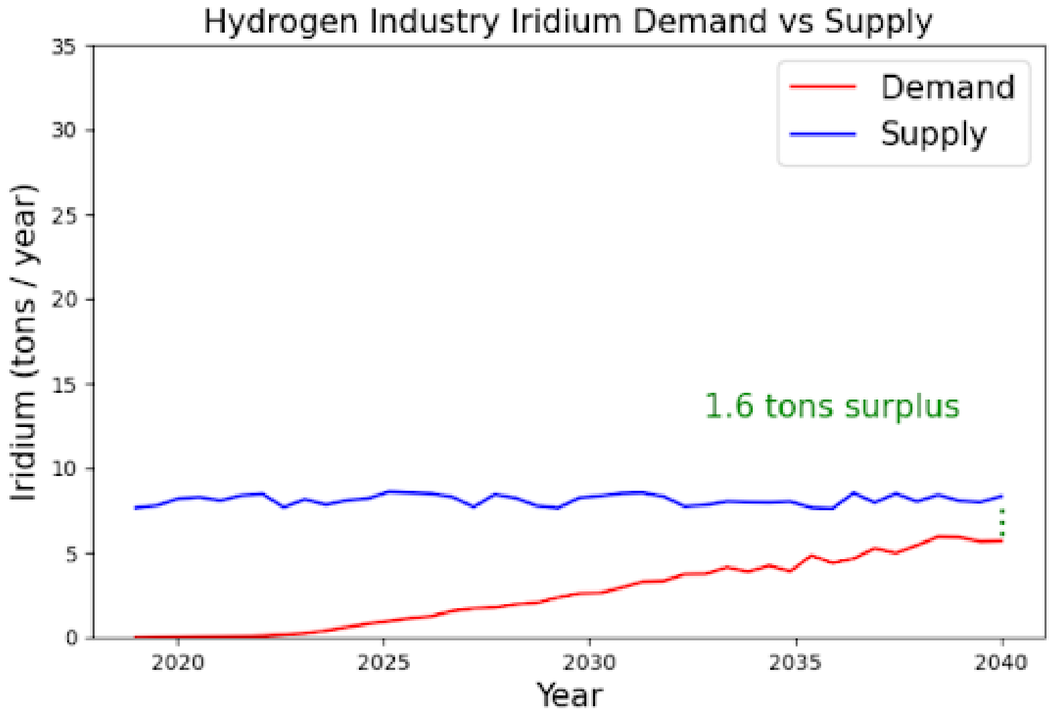
- **Iridium catalysts account for 40% of the cost of a Hydrogen Facility**

Particle-N Prevents the Iridium Shortage

Current Trajectory by Johnson Matthey



The World with Particle -N



Sources:

PGM market report, Johnson Matthey PGM market research, 2023

Clapp, Mark, et al. "Perspectives on Current and Future Iridium Demand and Iridium Oxide Catalysts for PEM Water Electrolysis ." 2023.

Rohstoffe für Zukunftstechnologien 2021

Leadership Team

Al Kasani

CEO

- **PhD Candidate** in Material Science, Center for Clean Energy Engineering
- 2 prior commercialized Inventions (**Revenue-generating**)

Steve Tricarico

Head of Operations

- **PhD Candidate** in Chemical Engineering
- 2 Years of experience in chemical operations

Sara Pedram

Material Manager

- **PhD Candidate** in Material science
- 5 Years Material development Experience

John Zhu

Sales

- **Sales**
- 4 years sales experience

Our Patent History

1ST PATENT
Sold 2019

2ND PATENT
Solar Cooling Tent Technology
Inventor: Al Kasani
Commercialization Sponsor: Coleman Inc
Patent application no: 63/357,353

Self-Air Conditioning Tent Just Needs a Gallon of Water To Stay Cool Inside

With summers now warmer than ever, enjoying the great outdoors inside a stiflingly hot tent is becoming less appealing than a vacation spent relaxing in an air-conditioned hotel room.

Yahoo News

https://news.yahoo.com/self-air-conditioning-tent-just-153000402.html

3RD PATENT
Core-Shell Manufacturing Technology
(+90% Saving For Precious Metal Cost)
Inventor: Al Kasani
Commercialization Sponsor: ParticleN
Patent Application: PCT/US2025/018324

DOE Targets

DOE Iridium Efficiency Goals (KW/gr)

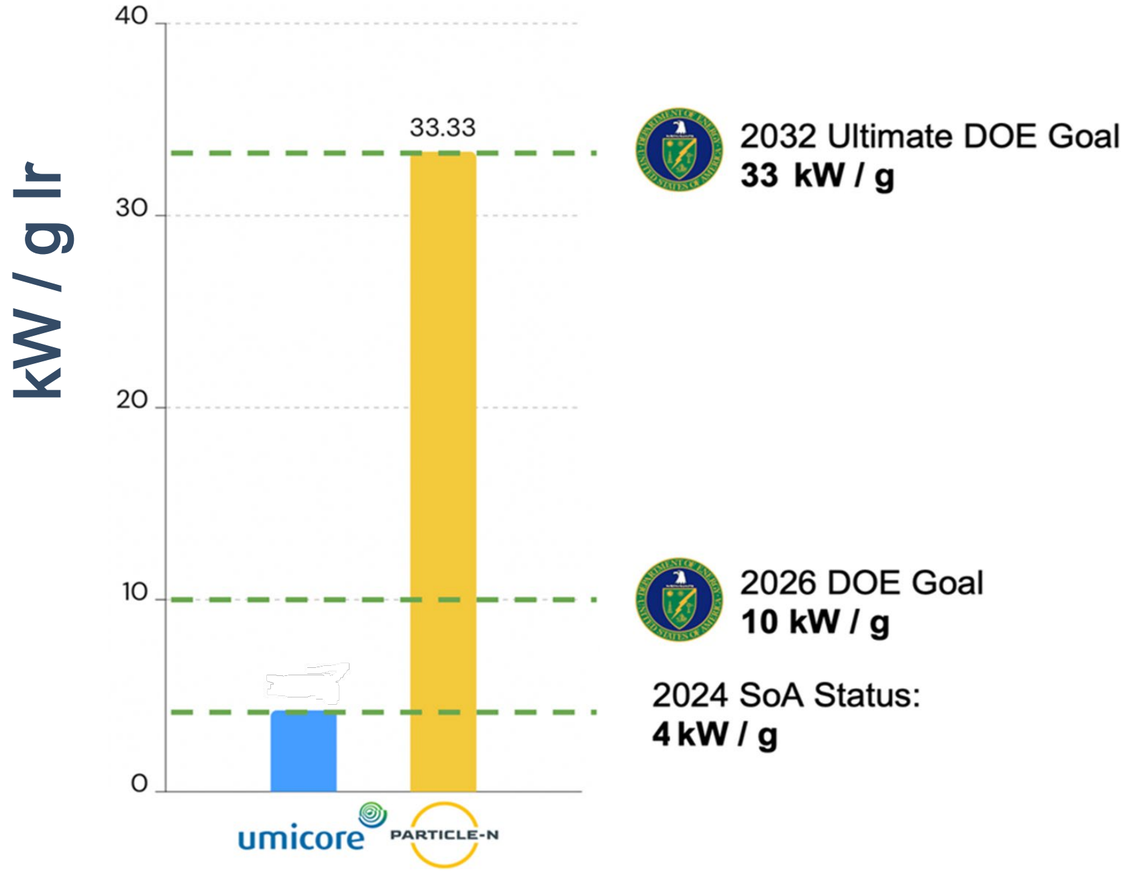
2024 Status: 4 KW/gr

2026 DOE target: 10 KW/gr

2032 DOE ultimate target: 33 KW/gr

Particle-N meets 2032 target TODAY!

Iridium Efficiency (kW / g)



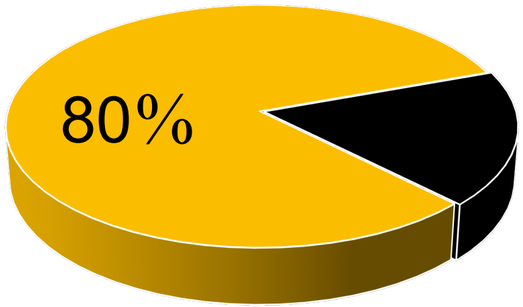
Source: Technical targets for proton exchange membrane electrolysis. (n.d.). Energy.gov

Particle-N vs. Market Leader (Umicore)

Element/Property	Unit	Umicore	Particle-N	Test Method or Procedure
Estimated Market Share	%	**60**	**0**	Market Reports
Particle Size Distribution, Diameter D95	nm	≤ 4000	≤ 18	TEM Microscopy: AV-PMC-FC-Digitizer
Surface area per grams of Iridium	m^2/ gr (Iridium)	53	404	N2 sorption SOP SOR-024-025
Efficiency	KW/ gr	3.7	33.3	Based on surface area
North Texas Green hydrogen Plant: Iridium Catalyst Cost 1.4 GW capacity (being built by Air Products and AES)	$	**$64 M**	**$7 M**	North Texas Plant Balance Sheet
California Cadiz Green Hydrogen Plant **2.75 GW capacity** (being built by RIC Energy)	$	**$115 M**	**$12 M**	Cadiz Plant Balance Sheet

Precious Metal: 80% of Catalytic Converter Cost

Precious Metal Cost



Other Cost
20%

NICB National Insurance Crime Bureau

MENU

News Releases

Share

Catalytic Converter Thefts Surge Nationwide, According To New Report

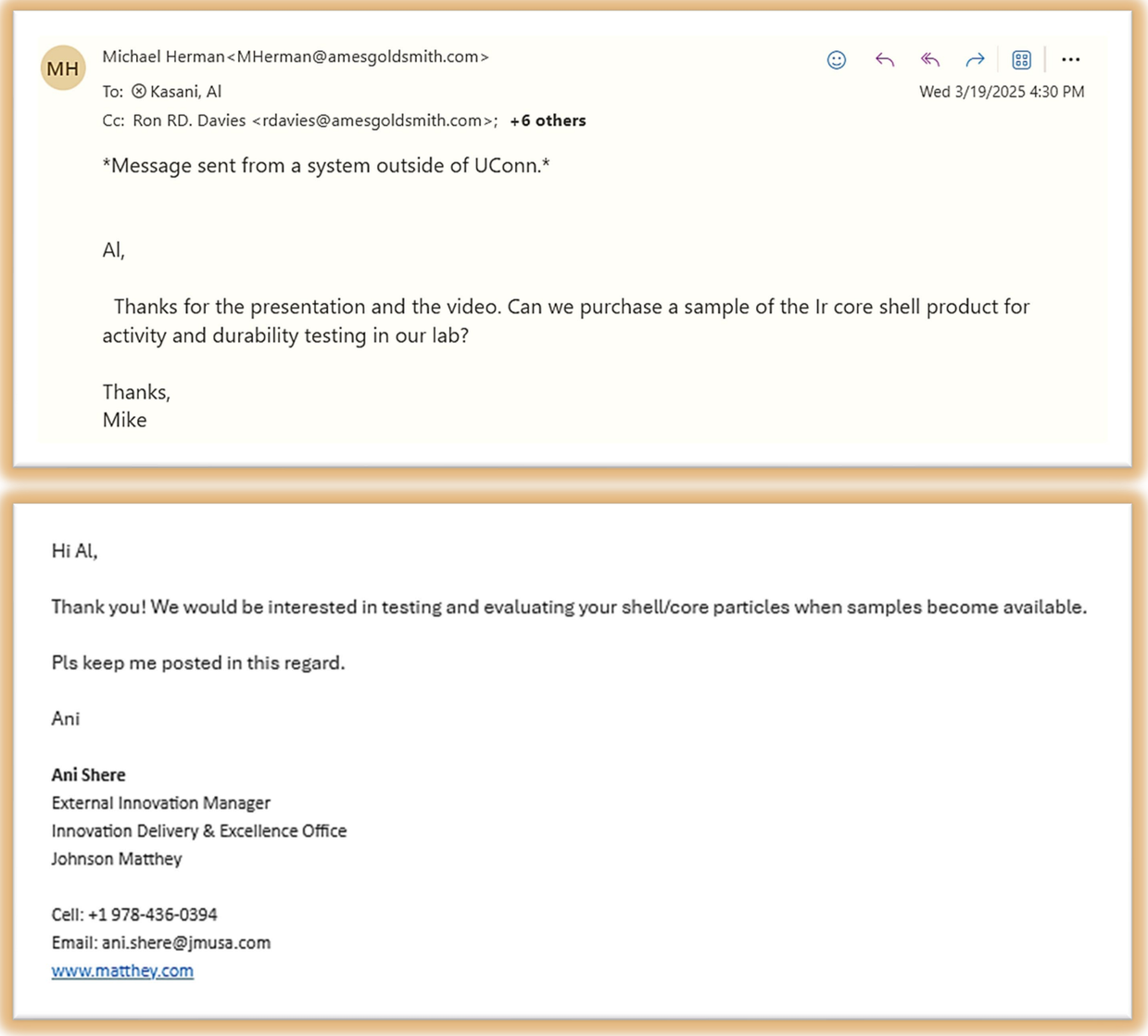
DES PLAINES, IL, MAY 10, 2023 – A new report based on insurance claims data released by the National Insurance Crime Bureau (NICB), the nation's premier non-profit organization dedicated to identifying, preventing, and deterring insurance fraud and crime, shows a surge in catalytic converter thefts across the country. In total, the nation experienced more than **64,000** catalytic converter thefts in 2022. Leading the country are **California and Texas**, which experienced **more than 32,000 catalytic** converter thefts last year.

Average cost: $2000

Core shell technology

Particle-N cost: $200

Traction and Pilot Trials



MH

Michael Herman<MHerman@amesgoldsmith.com>

To: Kasani, Al

Wed 3/19/2025 4:30 PM

Cc: Ron RD. Davies <rdavies@amesgoldsmith.com>; **+6 others**

Message sent from a system outside of UConn.

Al,

Thanks for the presentation and the video. Can we purchase a sample of the Ir core shell product for activity and durability testing in our lab?

Thanks,
Mike

Hi Al,

Thank you! We would be interested in testing and evaluating your shell/core particles when samples become available.

Pls keep me posted in this regard.

Ani

Ani Shere
External Innovation Manager
Innovation Delivery & Excellence Office
Johnson Matthey

Cell: +1 978-436-0394
Email: ani.shere@jmusa.com
www.matthey.com

Johnson Matthey — Inspiring science, enhancing life	Revenue: $**22B**
BASF — We create chemistry	Revenue: $**75B**
plug™	Revenue: $**891M** 27% YoY Growth
Heraeus Precious Metals	$29B Revenue
TANAKA — TANAKA PRECIOUS METALS	Market Cap 7.18B JPY
nel	2023 Rev: $**248M** 17% CAGR
AMES GOLDSMITH CEIMIG	Privately held

Technical Advisors

Leonard Bonville

- Former VP of Engineering at UTC
- Designed the Oxygen systems for **Apollo programs**
- **+50 years** of clean energy product development

Radenka Maric, PhD

- President of University of Connecticut
- Oversees $3.1B UConn revenue
- **20+ years** experience in hydrogen, clean energy research, and entrepreneurship

Alex Papandrew, PhD

- Senior Scientist at Mott Corporation
- Expert in precious metal catalyst systems
- **+16 years** of experience in clean energy technologies

Jasna Jankovic, PhD

- Associate Professor, Department of MSE Uconn
- PI in over 16 government and industry contracts
- **+16 years** of research experience in renewable energies

Business Advisors

Keith Fox

- **Former VP at Apple**
- Former VP at Cisco

- **35+ years** experience business marketing

Michael Cantor, J.D.

- Founder of Cantor Colburn, LLP
- **US Rank #4** in utility patent issuance by USPTO

- **30+ years** experience in technology IP law

Richard Guha

- CEO of a Fortune 100 company, Chief Marketing Officer of two others, led several start-ups

- **+45 years** Management experience in Finance, Operations, Marketing and General

Coleman Levy

- Founding Partner of Levy & Droney P.C.

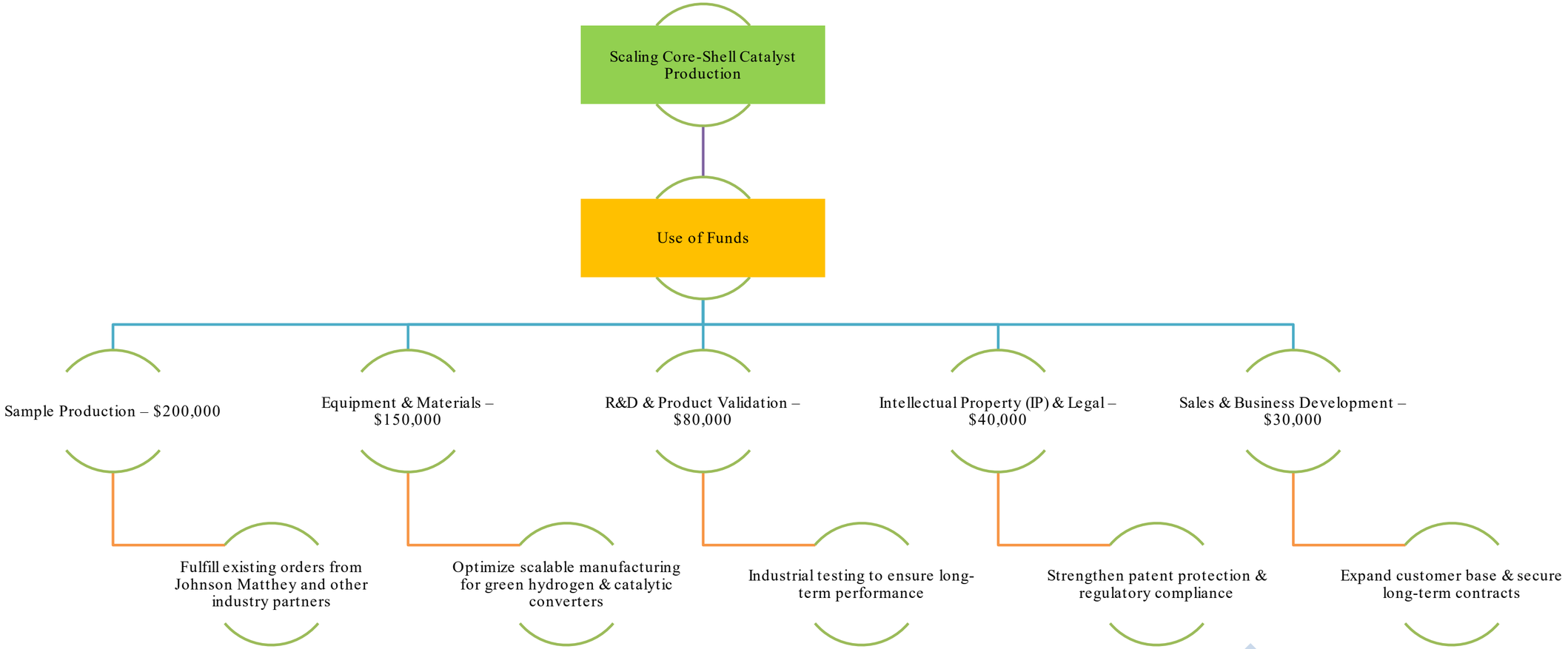
- **+50 years** experience in business law

Particle-N's Initial Revenue Streams

1. **Manufacturing** our catalyst for the green hydrogen industry

2. **Licensing** our manufacturing process to a large chemical manufacturer

Investment Ask: $1,000,000



Why Invest?

✅ Disruptive core-shell technology: Reduces PGM usage by 90%
PCT Patent Application: PCT/US2025/018324

✅ $23B market opportunity: Green hydrogen, fuel cells, and auto catalytic converters

✅ Strong traction: Orders secured from industry leaders

✅ Scalable and cost effective: Seamless adoption into existing supply chains

Thank you!

Investment tip: You might consider shorting Iridium after we fully launch!

Test Results Comparison vs UMICORE commercial IrOx catalyst

No.	Element/Property	Unit	Umicore	Our Work	Test Method and Procedure
1	Ir content*	% w/w	≥ 73.00 ≤ 77.00	≥ 46.00 ≤ 48.00	ICP-OES AV GRD-ACC-HU-1267
2	Nb content*	% w/w	≥ 6.0 ≤ 9.0	≥ 2 ≤ 3	ICP-OES AV GRD-ACC-HU-1267
3	Surface Area (BET)*	m^2/g	≥ 30 ≤ 50	≥ 180≤ 200	N2 sorption SOP SOR-024-025
4	IrO2 crystallite size*	nm	≥ 5.0 ≤ 7.0		XRD + Rietveld Analysis SOP ROE-0002
5	Drying loss*	% w/w	≤ 3.0	≤ 1.8	TGA AV-GRD-ACC-HU-1299
6	Cl content*	ppm	≤ 3000	≤ 1	Wickbold AV GRD-ACC-HU-1289
7	Fe content*	ppm	≤ 30	≤ 4	ICP-OES AV GRD-ACC-HU-1267
8	Sum of other Fenton metals (Cu, Ti, V, Zn, Cr, Ni)*	ppm	≤ 20	≤ 1	ICP-OES AV GRD-ACC-HU-1267
9	Particle Size Distribution, Diameter D95	nm	≤ 4000	≤ 5	TEM Microscopy: AV-PMC-FC-
10	Surface area per grams of iridium	m^2/Ir gr	53	650	

Progress to Date

PARTICLE-N
Core-Shell Technology

2024

- Fully functional production machine
- Won 8 awards and $110,000 non-dilutive
- Iridium catalyst prototype

2024

- Secured manufacturing space
- I-Corp Program
- Provisional Patent Filled
- SBIR pitch $280,000 accepted
- Engineering firm to build automated machine
- Partner with Nel Hydrogen and UConn's Center for Clean Energy Engineering for Pilot trials

2025

- Pilot Trials with
  - **Rhodium Mater mines**
  - **Johnson Matthey**
  - **Synthesis with catalysts**
  - **Ames Goldsmith Inc.**
  - **Sabin Metal Group**
  - **Advanced Catalyst systems LLC**
- Sample Sales

2026

- Licensing Model
- First Bulk Sales (50K+ per order)

Business Advisors

Keith Fox

- **Former VP at Apple** working with Steve Jobs
- Former VP at Cisco

- **35+ years experience business marketing**

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The Green Hydrogen Market is our Beachhead!

The Particle-N Solution

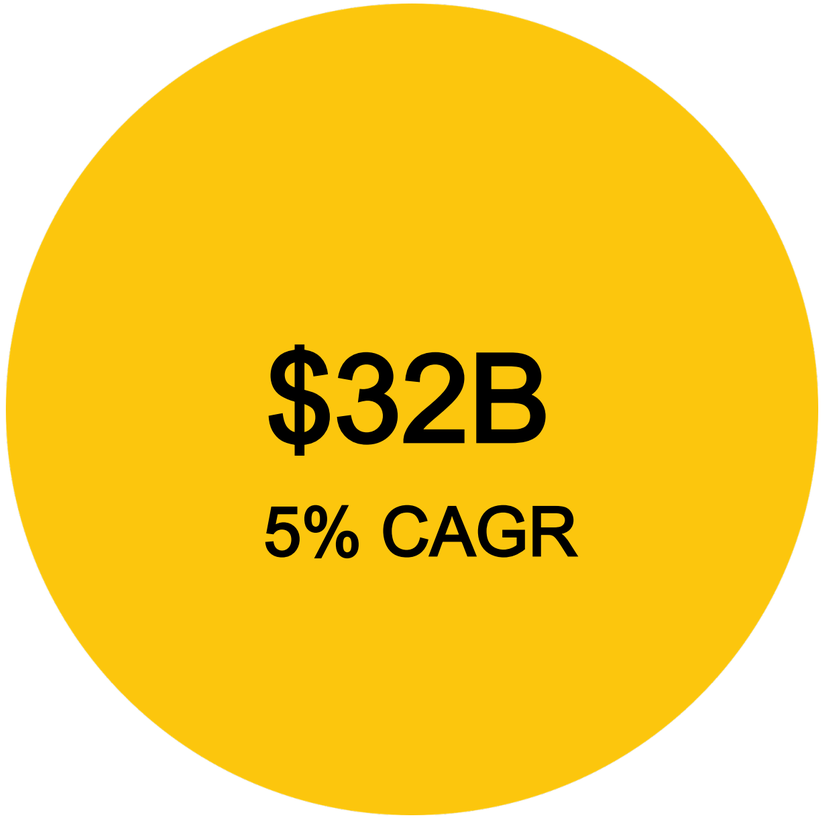
Patent-pending technology that can **reduce the precious metal catalyst cost by**

90%

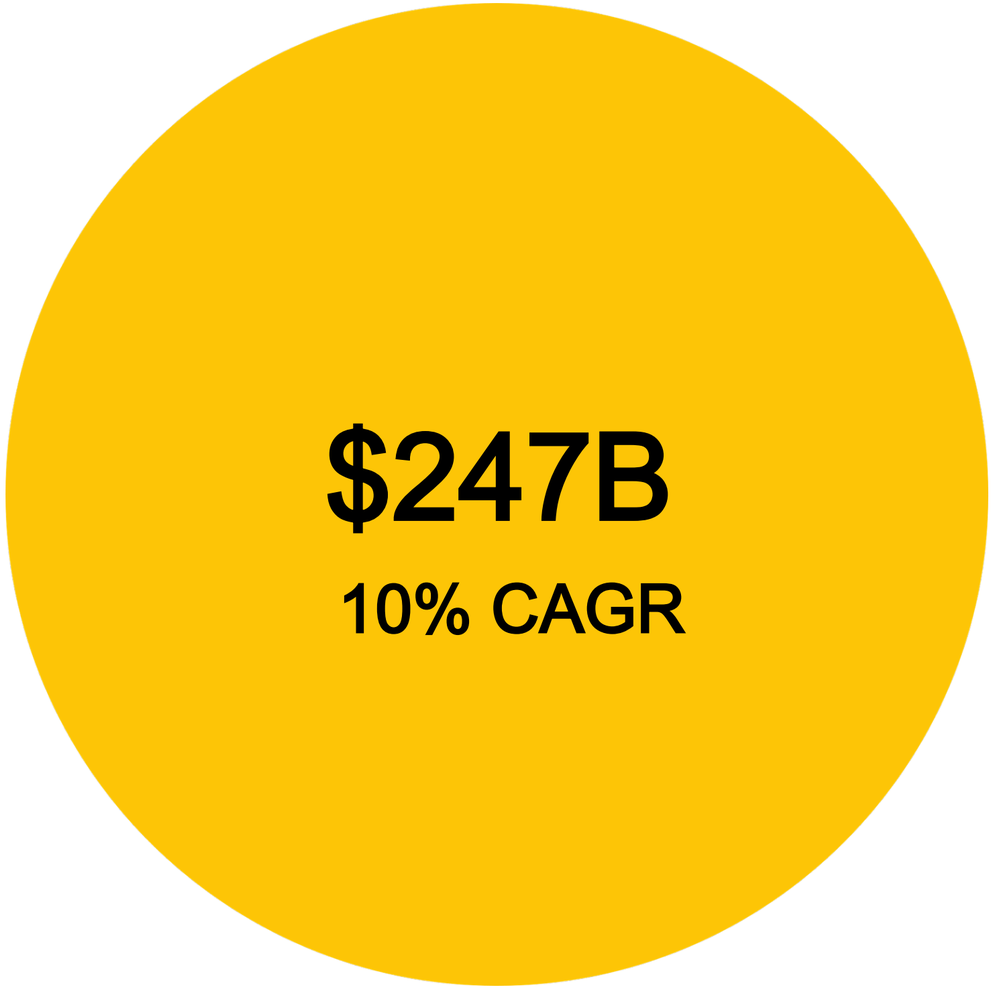
Our Potential Markets are Growing

Precious Metal Catalyst Market
(Obtainable Market)

Metal Catalyst Market

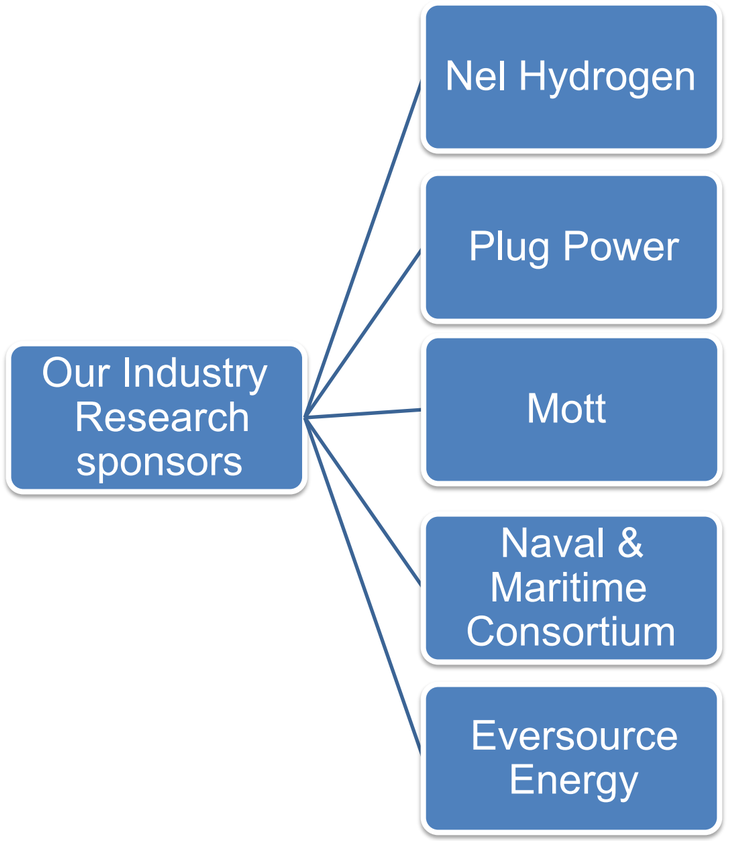


Global Hydrogen Market

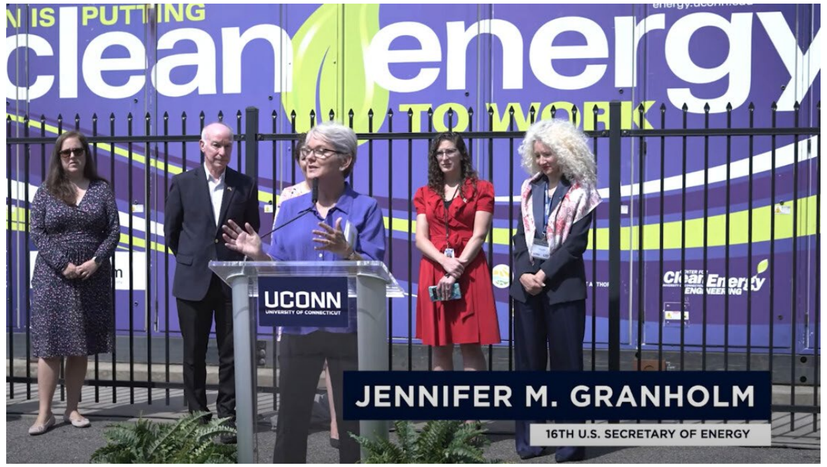


Source: Department of Energy Market Reports

Green Hydrogen & Fuel Cell Industry Challenge

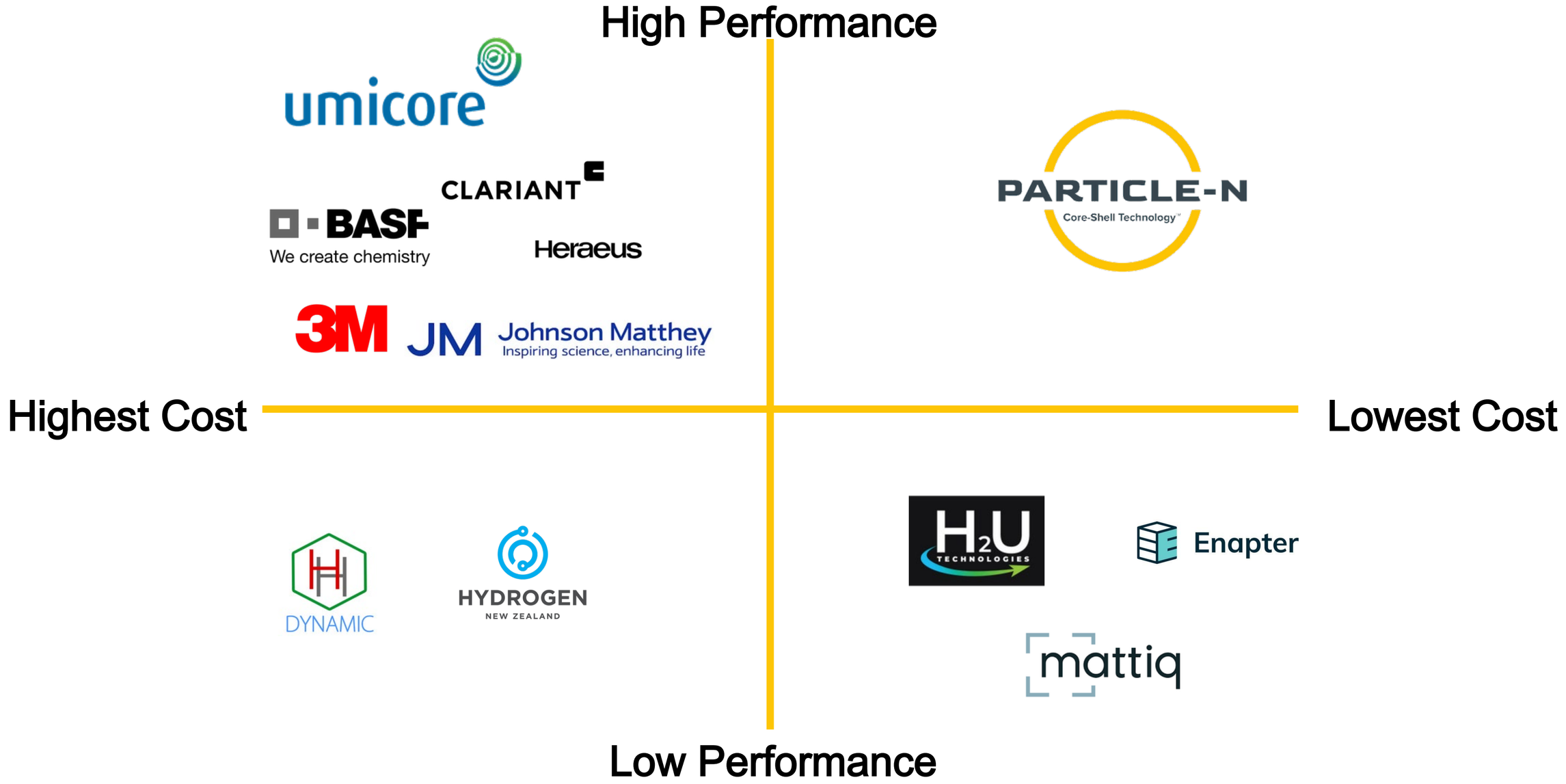


Precious Metal $ Cost for Green Hydrogen: ~40% of Material Capex



Energy Secretary Visiting our Research Lab

Competing Technologies



Anticipated Pilot Contracts

"I love what you showed me, this could really shake things up!"

Dr. Cortney Mittelsteadt ,
VP of Technology at
Plug Power
(Fuels Amazon's Truck Fleet)

plug™ — 2023 Rev: **891M**
27% YoY Growth

HyAxiom™ A Doosan Company — A Doosan Co.
$1.4B Valuation

SKYRE — Privately held

nel — 2023 Rev: **248M**
17% CAGR

Particle-N Core-Shell Technology

Title of Invention: COATED PARTICLES AND METHODS OF MANUFACTURE THEREOF

Ownership: 100%

Application #: 63/560,943

Patent Filed by Cantor Colburn

US Rank #4 in Utility Patent Issuance by USPTO

*Rendition

Financials

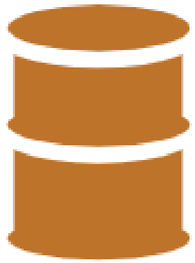
Expansion Beyond Green Hydrogen

- Our Financial Projections only include sales to the Green Hydrogen Industry
- As sales grow, we will build our team around other industry verticals

Automotive
(Catalytic Converters)

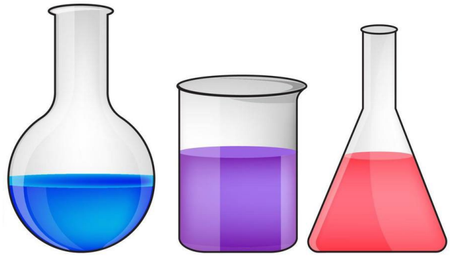
$14 B

Oil Refining



$3.2 B

Chemicals



$2 B

Team & Advisors

Raising a Pre-Seed Round

PARTICLE-N

Core-Shell Technology

1392 Storrs Rd #107, Storrs, CT

06269, United States

www.particle -n.com

contact@particle-n.com


PARTICLE-N
Core-Shell Technology
HYDROGEN H2
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Partnerships

UConn Technology Incubator Program (TIP)

- Received Free Lab Space

Cantor Colburn LLP- a leading IP Law Firm

- Submitted Provisional Patent

Uconn Center for Clean Energy Engineering

- Additional R&D Resources

Engineering Firm

- Automated large scale machine

Tech Transfer Specialists

- Licensing

BBC Grant Writing Service

- Drafting PhaseI SBIRProposal

Umicore vs. Particle-N

No.	Element/Property	Unit	Umicore	Particle-N	Test Method and Procedure
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	Particle Size Distribution, DiameterD95	nm	≤ 4000	≤ 18	TEM Microscopy: AV-PMC-FC- Digitizer
9	Surface area per grams of iridium	m^2/ gr (Iridium)	53	404	N2 sorption SOP SOR-024-025
10	Efficiency	KW/ gr	3.7	33.3	
11	Estimated Market Share	%	60	0	Market Report
12	Michigan plant: Iridium Catalyst Cost for a 4Gigawatts Green Hydrogen Generation Plant (being built by Nel Hydrogen 1)	$	**$181 M**	**$22 M**	Michigan Gigafactory Balance Sheet
13	North Texas Plant: Iridium Catalyst Cost for a 1.4 Gigawatts Green Hydrogen Generation Plant (being built by Air Products and AES*)		**$64 M**	**$8 M**	North Texas Plant Balance Sheet

Other PMC Markets

Application	Process/ Product	PGMs	Life (year)
Oil-Refining	Reforming	Pt; Pt/Re, Pt/Ir	1-12
	Isomerization	Pt; Pt/Pd	
	Hydrocracking	Pd; Pt	
	Gas to liquid	Co + (Pt; Pd; Ru; Re)	
Chemicals	Nitric acid	Pd	0.5
	Hydrogen peroxide	Pd	1
	Hydrogen cyanide	Pt; Pt/Rh	0.2-1
	Purified terephthalic acid	Pd	0.5-1
	Vinyl acetate monomer	Pd/Au	4
	Ammonia*	Ru	
	Oxo alcohol	Rh	1-5
	Acetic acid	Rh; Ir/Ru	
Other Processes	Hydrogenation, oxidation, debenzylation	Pd; Pd/Pt Ru; Rh; Ir	0.1-0.5
Automotive	Catalytic converters	Pt/Rh; Pt-Pd-Rh; Pt	>10
	Diesel particulate filters	Pt/Pd	

Source: (Department of Energy, *Platinum Group Metal Catalysts Report*, 2022)

Other PMC Markets

Modern PGM Catalyst Applications:

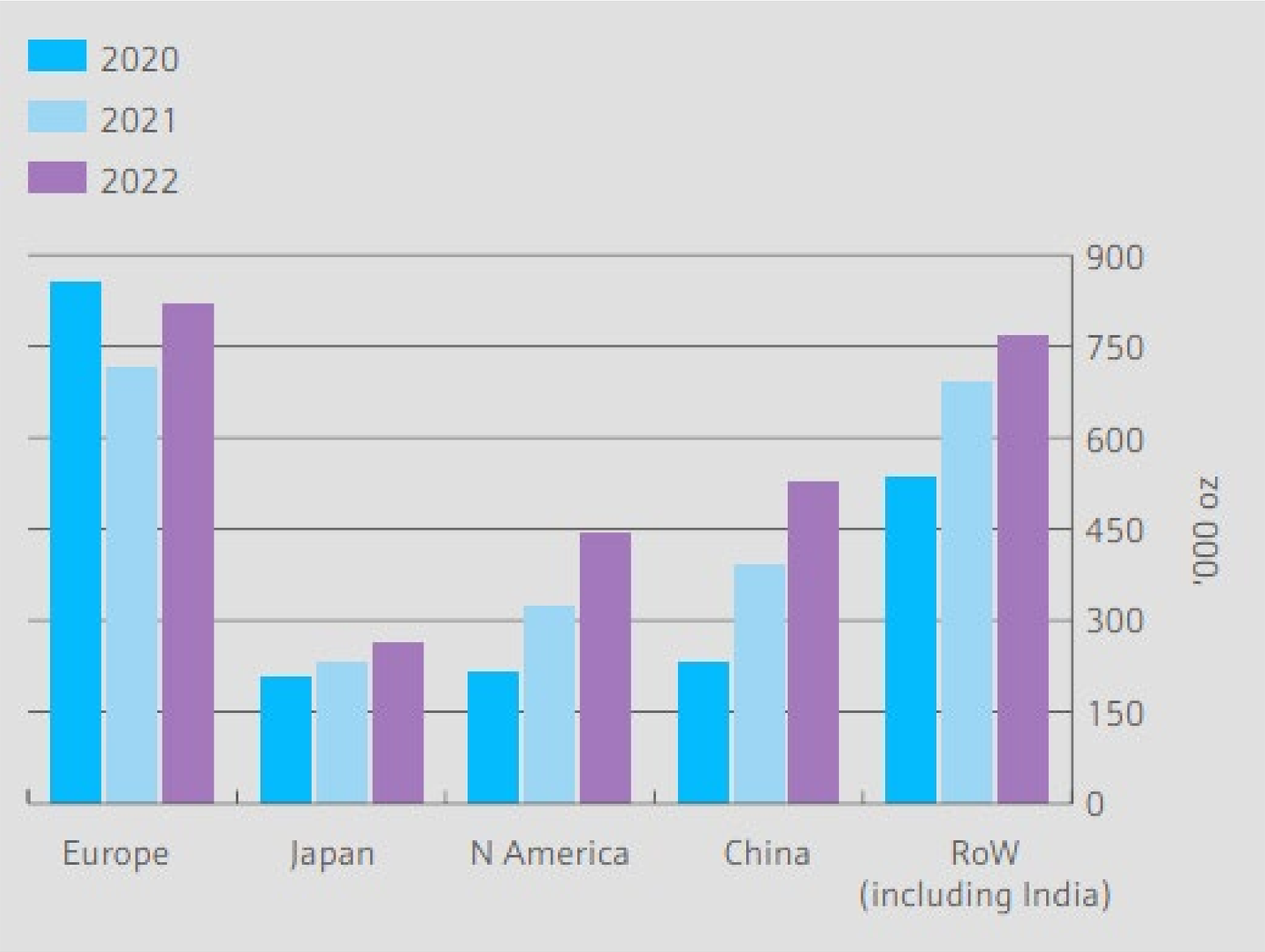
Light-duty vehicle PEM fuel cells	Green hydrogen fueling	Pt	8 ~ 10
Heavy-duty vehicle PEM fuel cells	Green hydrogen fueling	Pt	10 ~ 15
PEM Hydrogen production	Green hydrogen	Pt / Ir	7 ~ 10 electrolyzers

Nascent PGM Catalyst Applications:

CO2 reduction reaction	CO2 electrolyzer for chemical	Ir or Pt	TBD
Nitrogen reduction reaction	N2 electrolyzer for ammonia synthesis	Ir or Pt	TBD

(Department of Energy, *Platinum Group Metal Catalysts Report*, 2022)

Automotive Demand for Platinum (Gross)



Automotive Demand for Platinum

Gross demand '000 oz	2020	2021	2022
Europe	856	715	820
Japan	208	232	261
North America	216	324	444
China	231	390	528
Rest of World	534	692	767
Total	**2,045**	**2,353**	**2,820**

Catalyst Choices for Green Hydrogen