The following is the transcript from Equifund's webinar "***Interview with Mivium CEO, Eric Tsai***" on 10/23/2024, which has been edited by Perplexity AI to enhance readability.

This shortened version (11-pages) was provided to help synthesize the full interview which is about 1 hour and 50 minutes long resulting in a 50-page transcript.

Full interview can be watched or listened to here:
https://equifund.com/interview-with-mivium-ceo-eric-tsai/

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Joining Mivium: A Tale of Friendship and Innovation

Why did you decide to join Mivium?

It all started with a phone call from an old college buddy, Rick. We go way back - overclocking CPUs, selling them on eBay, even running a motorcycle business together. But life took us in different directions, until that fateful day when Rick reached out.

He was mysterious, insisting I sign an NDA before he'd spill the beans. Naturally, I was skeptical. Why all the secrecy between friends? But Rick was persistent. He flew down from the Bay Area to LA, knocked on my door, and said, "Look, I'm going to tell you what we're doing, but you've got to sign this."

Curiosity got the better of me, and I signed. What Rick revealed was mind-blowing. His father, Jim, had patented a groundbreaking technology. But my first reaction wasn't excitement - it was doubt. "Why are you telling me about this? I don't have any experience in this field," I told him.

We sat down in a conference room, and Rick laid out their vision. He drew a diagram of the business plan - one that still hangs on my wall today. But I didn't jump in right away. I knew they faced challenges; they were brilliant engineers and scientists, but not business people.

So, I dove deep. I spent months learning about the semiconductor industry, talking to experts, and really grasping the potential of what they were working on. It took almost three years, but eventually, I saw it: an opportunity to be a beginner again, to learn a new industry from the ground up, and to deliver something society desperately needs.

That's when I knew - this wasn't just a business opportunity. It was a chance to make a real difference.

Building a Dream Team: From Skeptics to Believers

How did you build the current management team?

Building our dream team was like assembling a puzzle where each piece had a mind of its own. At first, it was just the three of us - Rick, Jim, and myself. We had a plan, but we needed more firepower.

We reached out to industry veterans we wanted on our advisory board. Two key players emerged: Gino and Chandra. Gino, our current COO, was once a top executive at Applied Materials and, believe it or not, Jim's former boss. Chandra, our CTO, also has an impressive background at Applied Materials and even taught at UCLA.

But here's the kicker - they didn't join us right away. These guys were in their 70s, with multiple successful exits under their belts. They didn't need to work another day in their lives if they didn't want to.

So, what made them join? It wasn't an easy sell. They challenged us, pushed us to refine our vision. "We want to see you get to a better place," they said. But more than that, they saw the potential in Jim's patent. Imagine that - with 40+ years of industry experience, they'd never seen anything like our approach to material science. That got them excited.

We were in the process of applying for CHIPS Act funding, and they decided to lend their names to our application. As we collaborated more closely and shared more details, they caught the bug. Earlier this year, they decided to join the company officially.

But even then, they wanted proof. They needed to see a sample of our product before they'd fully leverage their connections to help us build our first facility. That's what this capital raise is all about - producing sample materials, getting them verified, and letting potential customers try them out.

It's like we're cooking up a revolutionary recipe, and we've managed to convince some of the best chefs in the world to join our kitchen. Now, we just need to serve up that first perfect dish.

The GaN Revolution: From Raw Material to High-Tech Marvels

What is your product roadmap?

Imagine a stream flowing from the mountains to the sea. We're at the very source of that stream in the tech world. The only folks before us are the mining companies. We take raw Gallium ore and transform it into something magical: Gallium Nitride (GaN) particles.

Think of it like this: we're making the flour for a high-tech pizza. Our GaN particles are that flour. We then turn those particles into wafers - that's our pizza crust. From there, others can add their toppings and bake the pizza

(creating GaN semiconductors), which then becomes part of a full meal (like an iPhone, Electric Vehicle, or Satellite).

Now, GaN isn't new. It's been around for decades. But it's been notoriously difficult to produce. Most GaN today is grown on top of silicon - imagine a silicon pizza crust with GaN toppings. The problem? They only want the GaN, so they have to use harsh chemicals to remove the silicon afterwards. It's expensive, inefficient, and creates toxic byproducts.

Our approach is different. We've essentially invented an "Instant Pot" for GaN. And while our first recipe is GaN, we could potentially use our technology to create other high-value materials like aluminum nitride and aluminum gallium nitride.

The key difference is our process. We don't use traditional chemical methods. Instead, we use mechanochemistry - initiating chemical reactions through mechanical force. It's not a common approach, but we've cracked the code.

Our plan? To price our products at or below the cost of silicon competitors. After all, why wouldn't people want something better for a lower price?

The Future of Mivium: Balancing Innovation and Market Strategy

Is your plan to license your IP? Produce everything yourself? Both?

That's the million-dollar question, isn't it? The truth is, we're keeping our options open. Our ultimate goal is market adoption. The faster the market adapts to our technology, the higher the demand, and the more everyone will want it.

On one hand, licensing our IP could lead to rapid adoption. Multiple players working with our technology simultaneously could accelerate market

penetration. On the other hand, producing everything ourselves could lead to higher margins and market control.

But here's the thing - we don't need to be the hero right away. We're upstream in the supply chain. If our product ends up in an iPhone or NVIDIA's data centers, we don't need to be NVIDIA or Apple. We can be the unsung hero, the secret ingredient that makes everything else possible.

Think about it this way: everyone has an iPhone, right? But the screens are made by Samsung, and there are antennas inside made by Qualcomm. Qualcomm needs materials to make their product, so they might go to TSMC and say, "Hey, make me this 5G antenna so I can sell it to Apple." Then TSMC would buy the materials they need.

There are so many variables in the supply chain that it's crucial for us to understand how to penetrate the market quickly. Licensing could help us do that rapidly. But we could also do it in parallel - license for a few years, then use that market knowledge to take control ourselves.

It's a bit like Walmart and Target creating their own store brands. They learn what sells in their stores, then make their own version. We're keeping our eyes on the long game while staying flexible in the short term.

The Mivium Advantage: Breaking New Ground in Semiconductor Technology

How come no one has thought of this before?

That's the question that kept me up at night for the first year before I joined the company. I had to see it for myself. I even went to a semiconductor trade show just to confirm that nobody else was doing this.

When we asked our PhD management team, they weren't surprised. But here's the key: most people in the semiconductor industry come from a

chemistry background. They learn chemistry, use chemistry, and the entire supply chain is set up for chemical processes.

We're using physics. It's a completely different approach.

Think about it like this: Einstein's theories have been great for 70 or 80 years, but now we're entering the realm of quantum mechanics. We're just getting to the next S-curve of innovation.

You've probably noticed that phones released in the last three to five years have only had marginal performance upgrades. That's because we've hit the limit of current materials. As transistors get smaller, power density increases, creating what's known as the "Power Wall." This has limited practical processor frequency to around 4 GHz since 2006.

So why hasn't anyone done this before? Because nobody in the industry thought to look outside of chemistry. They're trained as chemists, so why would they consider a non-chemical solution? Why move to physics when your entire background is in chemistry?

We're not just thinking outside the box - we're building a whole new box.

Mivium's Market Position: High Margins in a Commodity World

How does Mivium compare to other semiconductor materials companies?

In the world of semiconductor materials, we're like a premium craft brewery in a market dominated by mass-produced light beers. Here's why:

Typically, most semiconductor materials are silicon-based, essentially refined sand. It's not very expensive, and the margins aren't high. It's like selling water - a commodity with a perfected supply chain over the last 70 years.

For us, it's the opposite. We can have very high margins because of our unique process. Let me give you an analogy: The bleach you use at home is about 0.01% purity. But in semiconductor facilities, they use 99.9% pure chemicals. Why? Because they stack materials like hamburgers, and to remove unwanted layers, they need ultra-pure hydrochloric acid. This creates additional costs and waste.

We don't have any of that. We're more like, "Here's the flour, we'll put it in the oven, and the bread comes out ready to go." It's faster and more cost-effective.

Now, there are companies that can take powders and make their own wafers, and there are companies that just want to buy wafers to make their own products. We're positioning ourselves to serve both.

The first subset of customers we're targeting are the IP-focused companies - semiconductor design firms, fabless companies like ARM and Qualcomm, or electronic design automation companies. They design products and equipment for the semiconductor industry.

The second subset is integrated device manufacturers (IDMs). They make specific components, like Qualcomm making modems for phones. They don't necessarily ask for GaN specifically; they ask for a product that meets certain performance specs. Then their engineers scour the world for materials that can do the job.

By offering both the raw GaN particles and potentially wafers in the future, we're setting ourselves up to be a crucial player in this complex supply chain, offering high-quality materials with potentially higher margins than traditional silicon-based products.

From Lab to Market: Mivium's Path to Commercialization

How do we know you can actually make this product?

We're on an exciting journey from concept to reality. In the next several months, likely by Q2 or early summer, we're aiming to have our first test batch of GaN particles coming out of the lab. But it's not as simple as just having a bag of "magic powder" and knocking on companies' doors.

Here's our roadmap:

1. **Production**: We'll produce our first significant batch of GaN particles.

2. **Verification**: We'll send our product to a third-party company for metrology - a rigorous process to verify the material's properties and provide certification.

3. **Publication**: Our CTO, Chandra, who's well-respected in the industry, will likely publish a paper detailing our new technique and the results.

4. **Outreach**: We'll invite potential customers and partners to our lab or send them samples for testing.

This process ensures that when we do approach companies, we're not just making claims - we have solid, verified proof of our product's capabilities.

As for regulatory approval, while we don't need specific approval to operate our business, we do need to meet industry standards. When selling materials, we must specify purity levels and meet quality standards. Different industries have different certifications - for example, the automotive supply chain requires TS Certification, while products that touch food need FDA approval.

Our goal is to work closely with our customers to ensure our product meets their specific needs and industry standards. It's a step-by-step process that minimizes risk at every stage, allowing us to prove our concept, optimize our technology, and scale up production in response to demand.

This approach not only de-risks our business plan but also makes us more attractive to investors. Instead of asking for a massive amount of capital upfront, we're moving in stages, hitting milestones that give confidence to financiers to provide more funding as we progress.

It's a journey from grams to kilos, from kilos to tons, each step bringing us closer to revolutionizing the semiconductor industry.

Scaling Mivium: A Measured Approach to Growth

What do you think about scaling operations?

Scaling Mivium is like building a high-tech rocket ship - we're doing it stage by stage, each one more powerful than the last. Right now, we're in what I call the "alpha" stage, optimizing our technology and proving our concept.

Our next milestone is the "beta" stage, or what we call the Pre-Production Pilot. This is where we'll start to scale up production, moving from producing small samples to larger quantities. It's not just about making more of the same thing - it's about figuring out what kind of tools and equipment we need to scale efficiently.

Here's how we're approaching it:

1. **Lab Scale**: Currently, we can make a few grams a day in our lab.
2. **Pilot Scale**: Next, we aim to produce a few kilos a day.
3. **Production Scale**: Eventually, we'll scale to making pounds, then tons per day.

We're matching our investment with the demand we're seeing. As orders start coming in, we'll have a clearer picture of what size facility we need to build.

In terms of headcount, we're keeping it lean for now. We're focused on optimizing our technology and gaining insights that will inform our scaling process. Instead of building a massive team upfront, we're outsourcing certain aspects, like metrology testing, to keep our costs down and maintain flexibility.

When it comes to equipment, the machines for making our GaN particles are all customized. We estimate it might cost $40 to $50 million to build a full-scale facility with all the necessary equipment. But we're not jumping straight to that. We're taking a step-by-step approach, possibly starting with a $20 to $30 million facility and scaling up as demand grows.

This measured approach to scaling allows us to minimize risk at every step. If we suddenly get a huge order from a company like Google or Microsoft, we can use that to secure financing for rapid expansion. But until then, we're growing smartly and sustainably.

Financing the Future: Mivium's Capital Strategy

What is your plan to raise all the capital you need?

Our approach to raising capital is as innovative as our technology. We're not putting all our eggs in one basket - we're exploring multiple avenues to ensure we have the resources we need to bring our vision to life.

One exciting opportunity we're pursuing is CHIPS Act funding. This is non-dilutive capital, meaning we don't have to pay it back and we don't give up any ownership of our company. The goal of the CHIPS Act is to boost domestic semiconductor manufacturing, research, and design - which aligns perfectly with what we're doing at Mivium.

We've already taken steps to position ourselves for this funding. Our team, including industry veterans like Gino and Chandra, have lent their names and expertise to our CHIPS Act application. Their involvement not only strengthens our application but also validates the potential of our technology.

But we're not relying solely on government funding. We're also raising capital from private investors. Our strategy here is to raise money in stages, tied to specific milestones. This approach allows us to minimize dilution and maintain control of our company while still accessing the capital we need to grow.

For example, the money we're raising right now is specifically to get us to our Pre-Production Pilot stage. This will allow us to produce larger quantities of our GaN particles and learn what we need to do to scale up production further.

As we hit each milestone, we become more attractive to investors. We're reducing risk with each step, proving our concept, and showing that we can execute on our plans. This makes it easier for us to raise additional capital at higher valuations as we progress.

We're also open to strategic partnerships that could provide both capital and industry connections. As we prove the viability of our product, we may find opportunities to collaborate with larger players in the semiconductor industry.

Our goal is to have a diversified capital strategy that gives us the flexibility to scale as needed without compromising our vision or control of the company. It's a balancing act, but one we're well-prepared to manage.

By taking this measured, milestone-based approach to fundraising, we're not just building a company - we're building a sustainable future for semiconductor technology.

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