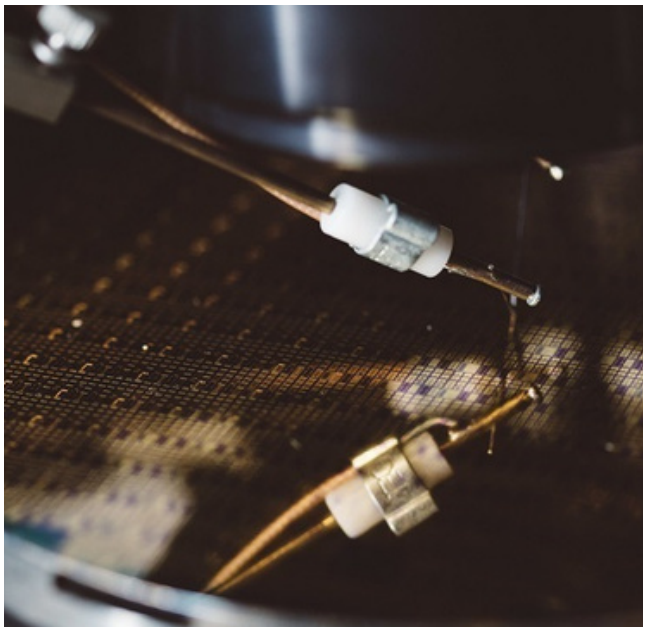
THE COMPOUND SEMICONDUCTOR MARKET IS EXCITING RIGHT NOW

Q&A with Caroline O'Brien, CEO of Kubos Semiconductors

By Dan MacNeill, Director – Gillamor Stephens

Kubos is a company that originally spun out of research from the University of Cambridge with the aim of improving the efficiency of green LED lights, which could in turn lead to huge energy savings and improvements in the concentration of staff and pupils in schools, universities and workplaces.

Caroline O'Brien has been CEO of the company since 2019 and has been in the tech industry for almost 30 years. In this interview, she speaks to us about Kubos' plans for the future, her successful career, and her thoughts on what the UK tech industry can do to increase the number of female CEOs.



Q: Can you tell us how you got to where you are now as CEO of Kubos?

A: I've been in the semiconductor industry now for nearly 30 years. I joined as a field sales engineer, worked my way up to sales director for big, well-structured multinationals and then branched out into more dynamic and faster-moving, but less well-resourced start-ups. Subsequently, I held various more senior positions in sales and marketing.

When you're in a commercial environment you get to learn a lot about how your customers run parts of their business. That gave me an insight into those mechanisms, and early in my career I also did an MBA part time which gave me some of the skills and insights into finance, operations, the areas I was less familiar with on a day-to-day basis.

Then the opportunity arose to run an audio company called Tectonic Elements, which I did, as MD, for about four years. This gave me a lot of insight into licensing and was also my first experience of running a business.

I went on to do another couple of senior general manager or VP of sales roles and gained a lot of board experience from working on different teams, then about three years ago the opportunity came up to work at Kubos. It really fitted my skill set. It was firmly in the semiconductor space, and I had the mandate to move the business from its early academic research stages into commercialisation. That's my main role in the business, to commercialise the technology.

Q: What does the business do and what's the problem you're looking to solve?

A: We were formed in 2017 with the goal of solving the problem of with green LEDs known in the LED market as the 'green gap'. Effectively, that's where green LEDs are very inefficient, compared with red and blue LEDs that are highly efficient. We have calculated we could save around 600m tons of CO_2 emissions over 5 years in lighting and displays alone, which is as much as 150 coal fired power stations.

The reason that full colour white light isn't produced today through what's known as a red-green-blue (RGB) colour mixed solution, is because of the green gap problem. This is why in your homes you get the choice of cool blue hues or warm candle glows. That's an artefact of the limitations caused by the green gap.

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By enabling these improved efficiencies in the green gap, we can then produce better colour hues which can improve things like concentration in schools, in offices, as well as producing better quality street lighting. There are all sorts of side benefits, but this is all hinged around the efficiency.

We've also extended our market reach to red micro-LEDs. Now we're effectively addressing lighting and the display market, which needs native micro-LEDs, and there's a challenge there with red LEDs that won't scaledown to the small form factors of micro-LEDs. Kubos can address both of these markets and potential improve the efficiencies significantly.

Q: What can Kubos LED technology offer against the competition?

A: The prime benefit is the improved efficiency. But Kubos also has another benefit which is that we can increase switching speeds over the traditional hexagonal gallium nitride that's used in blue LEDs today. We're potentially more than twenty times faster in terms of our switching speeds, which has got interesting applications for LiFi in communications, for example.

Q: What do the next three to five years have in store for you as CEO of Kubos?

A: Our business model is a licensing and royalty model, so the plan is very much based around customer engagement. Our technology can slot seamlessly into the production lines of the LED manufacturers, so we've got very low barriers to entry in terms of transferring our technology. Building those customer relationships is our biggest focus.Longer term, but within the next five years, the plan is to be acquired by one of these LED manufacturers. That's the expectation.

Q: How have you seen the landscape of deep tech – and semiconductors in particular – evolve over the last decade or so?

A: The main shift just over 15 years ago was the change from semiconductor manufacturers being vertically integrated to the models they have today which are known as the IDMs (integrated device manufacturers) or the "fabless" models as we know them.

That move was probably one of the biggest changes in this industry. It opened up opportunities, particularly for small, more agile businesses, because then a company didn't need their own wafer fab, test and packaging. They could be a lot lighter in terms of investment and didn't need the millions and millions of pounds for setting up the semiconductor manufacturing.

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You didn't need that kind of investment so you could actually enter the market. That was a big change, but it also coincided with another big change in the UK market, which was that a lot of the end customers of the semiconductor industry moved their production offshore, mainly to China.

Today we're in a situation over the last 15 years where there aren't as many semiconductor manufacturers in the UK. There aren't as many semiconductor design companies in the UK either. That's a real shame, and I think it's a missed opportunity. National security's a big issue at the moment and this is one of the weaknesses in that supply chain that we don't have that fundamental component technology in this country anymore.

Q: Why do you think there aren't more female CEOs of UK tech businesses?

There aren't that many tech CEO roles in the UK to begin with. By definition, there will also be fewer female CEOs. The question is, why aren't there more CEO roles in the UK? That is the challenge. How do we create those new businesses?

Another part of this is how you build out a supply chain, there are lots of different roles and employment opportunities. There's firmware, software, test and characterisation, packaging andthere's the wafer manufacture, which is very involved. The whole supply chain is very extensive, and it's like a snowball. As it goes downhill it gathers momentum and more mass.

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What I see, particularly in the compound semiconductor market in the UK, is exciting. It's almost like where the semiconductor industry was 20 – 30 years ago when I joined. Everything's possible. Everything's inspiring. We can do this. There's lots of opportunities in all those sectors I've just mentioned.

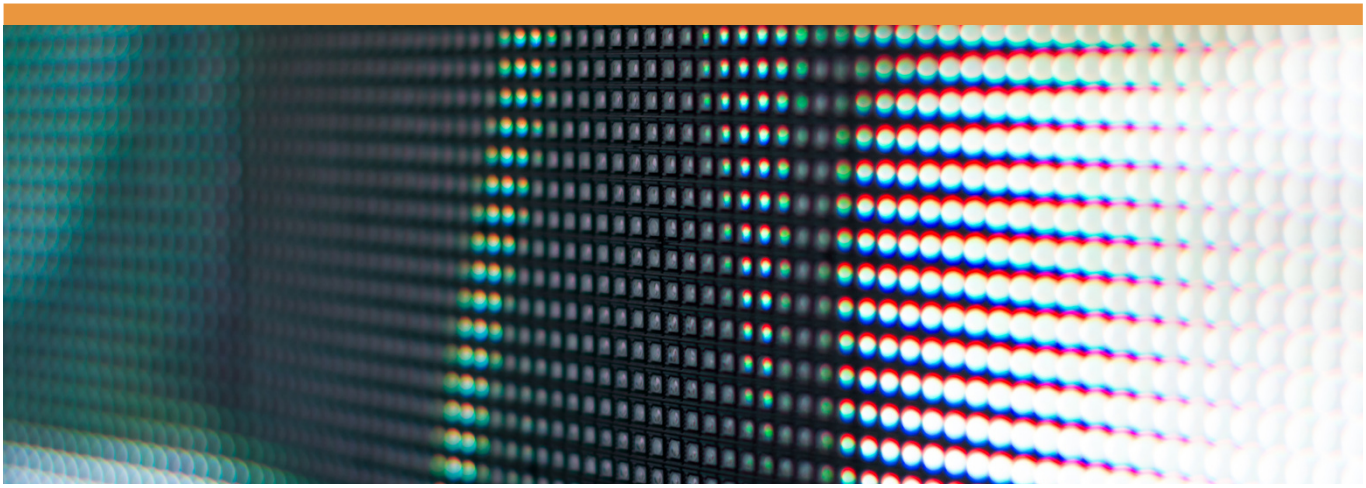
What's interesting in the compound semiconductor industry is that there are a number of female CEOs already, and I believe that's because the industry is a 21st century industry. As such, it's about getting the right people into the right place, being diverse in that way, and flexible, and to create the type of companies that we need to really go forward from here. We need more companies, ergo we'll end up with more CEOs, and as such we'll naturally end up with more female CEOs.

The challenge is to create these businesses and to make them more sexy , interesting and dynamic to attract the next generation of industry leaders. We lack companies with that kind of draw but when you have them, they pull through everything else, and we would have more businesses in the sector. Then we'd definitely have more female CEOs.

Q: What do you think needs to be done to attract and retain more women in the deep tech sector?

A: I think we're actually doing a reasonable job of this already. Women have to start young, like I did. They need to choose to go into engineering, or other tech segments.

Last year I did a presentation to some teenage girls about STEM and it was about promoting girls in electronics. I was hugely impressed by the level that these young women were at in terms of their knowledge and even their ideas and ambition. So something is working there.



Maybe we need to do more of it, but again it's the same argument. It's not just about bringing in female engineers and female scientists. It's about bringing more people into the industry at an earlier age. It takes time.

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One of the challenges we have now is that a lot of my peers have left the sector. They've gone to other sectors like cybersecurity, or SaaS. All of which are very technical sectors, but they've left to join these businesses because they're going places, they're dynamic and exciting, and you're not going to get those people to come back to the industry now.

So we have to grow more people through and bring them up. Either we bring people through the industry, or we bring them in from overseas, which has its own challenges. People from the US come with US salaries, and there is a disparity there.

Q: What advice would you give to anyone aspiring to get to where you are today?

A: You have to aim high and be ambitious. We see it a lot today in terms of reality TV. We often see people shooting for the sun, the moon and the stars in other industries. Why not in ours?

Maybe you can set up your own company. Maybe you can join a company and help them grow, or help them to bring a new technology to market. When you have that ambition and aim high, then even if you don't quite get there, you're certainly on the journey and you're learning.

Another challenge we have in the UK is the fact that when we undertake roles or go into a new company, we don't want to fail. In the US, it's seen as part of your experience and all part of building you as an individual. We need to be more flexible on that here.

You tend to learn a lot more when things go wrong compared to when they go right. We need to have different approaches to our culture around business and entrepreneurialism, especially for the next generation coming through.

Apart from aiming high and not being afraid of failure, one thing I think we often forget today is to enjoy it and have fun. You probably spend more time at work than at home, so you've got to enjoy it. Every day's not going to be a blast, but when you do something you enjoy, then that shows in how you do it and what you do. If you find you're not enjoying it, then you need to ask yourself whether you're doing the right thing. You might be in the right industry, just in the wrong role. What do you enjoy? What makes you happy? This affects all our lives.