



# SILICON STARTUP SOLUTIONS

A SILICON CATALYST NEWSLETTER

A VALUABLE RESOURCE FOR THE SEMICONDUCTOR STARTUP COMMUNITY

it starts with startups



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# CEO'S CORNER

## A Book Review, Really?

One of my favorite surprises each year is receiving an email at the beginning of the holiday season with a collection of book reviews. It's written by an acquaintance who happens to be a venture capitalist. I don't know him terribly well, certainly not as well as I'd like, but when his name comes up in conversation, usually around topics concerning his VC firm, the conversation moves in one of two directions - how darn smart he is, or how much we enjoy his annual sharing of his favorite books of the year.

His reviews are exceptionally artfully written and insightful, providing both a great introduction to each book, as well as an insight into his thinking and personality. So, naturally, I thought in this newsletter I should take a shot at a suggestion or two, and a brief review. Don't worry - I won't start sending out book reviews at Christmas, as I'm perfectly happy reading those of others.

I want to share two books with all entrepreneurs and would-be entrepreneurs. One book is an enduring favorite that I recently reread, and the other is a new book. The enduring favorite is E.O. Wilson's "Consilience: The Unity of Knowledge", wherein he connects many different areas of human knowledge, particularly science across the ages. It's a great read, particularly for scientists and engineers with a humanist bent.

It's the other book I'd like to urge new entrepreneurs to read, and old entrepreneurs to reconsider their strengths and weaknesses in building a new business. It's "The Startup Playbook" recently written by Rajat Bhargava and Will Herman, both serial entrepreneurs turned investor and advisor. I had the privilege of working with Will when his company acquired our startup many years ago.

Will isn't the visionary in a company. He's an operations guy - a doer in every sense. Startups are filled to capacity with

visionaries. When I look at the ones that succeed, a common factor is a strong team that usually incorporates a strong operations manager with an otherwise unconstrained visionary.

The book, which I've just finished, is pure Will. It's divided into four sections, "I want to start a company", "getting off the ground", "funding your startup", and "running your company". It's a high level, but complete, view of the entire process. Rajat and Will question why one wants to, whether one is able to, and how one builds a company from scratch. They emphasize the need to get agreement early with cofounders and employees in compensation, equity distribution, and what to expect about future dilution. They dive into the definitions and explanations of corporate structure and boards and how to incorporate your business, when and where. They explain the various sources of funding - friends and family, angels, VC, crowdfunding, and crowdsourcing and where each may be appropriate. They focus largely on the customer, their needs, and the culture of the company you want to build. They're quite right - getting any of those things wrong initially is very hard to correct later.

What I like most about this is that it's all built on experience. Both have had several successes, and several failures "hands-on", and a lot more experience as investors - coaching 100s of companies, investing in 70 or so directly. The serious business of building a company is all about execution, and much of what happens today in startups, particularly visionary-led ones, sidesteps that learning.

Most entrepreneurs today seem to know the chorus - they produce pretty good pitch decks, but the next level is to understand the 'why'. The Startup Playbook is a good introduction to that, and keeping both the book at hand and mentors nearby will keep you and your company focused on your customers, their needs, and the culture of your company.

VOLUME 4

# IN THIS ISSUE

In this edition of Silicon Startup Solutions, a newsletter published by Silicon Catalyst to foster meaningful dialogue within the semiconductor startup community, we feature an interview with Portfolio Company CLOPTech as well as an interview with In-Kind partner EAG. Enjoy.

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The featured Portfolio Company in this issue of Silicon Solutions is the Singapore-based startup, CLOPTech.

In October of 2015, Silicon Catalyst partners Dan Armbrust and Lance Bell were invited by the government of Singapore to explore both the semiconductor and startup landscapes. Company co-founder Armbrust delivered a keynote address at Singapore's annual SSIA meeting. During an executive round table discussion, Dan was asked, 'what would you see if you looked into a crystal ball to predict the winners and losers in silicon-based startups?' His answer was simply, 'I'd see a crystal ball.' Those were prescient words of wisdom, as witnessed by the fact that in Silicon Catalyst's 3 year history, having reviewed over 200 applications from around the globe, there is no good indicator as to where the most viable startups come from.

It's interesting to note that while the government of Singapore has a hearty appetite for wanting to fuel a semiconductor startup ecosystem, CLOPTech found success by screening with Silicon Catalyst.

*If you are reading this and are involved in or know someone involved in a semiconductor startup, we encourage you to reach out to us.* As the world's only incubator for solutions in silicon, Silicon Catalyst is successfully guiding fourteen Portfolio companies, including CLOPTech, along the path to technology and business development, funding and a meaningful future.

This issue of Silicon Solutions is being published in advance of our 7th screening meeting where we hope to find our next Portfolio company whose innovative solution could change the world.



Silicon Catalyst's gracious hosts in Singapore led by distinguished Professor Dim Lee Kwong, Executive Director of the Institute for Infocomm Research (I2R), Agency for Science, Technology and Research (A\*STAR), Singapore and a Professor of Electrical and Computer Engineering at the National University of Singapore (NUS).

## The Quantum Man Effect

Art, science and technology all change the way we experience the world.

by Judy Davies

Recently I saw an art exhibit by one of my favorite artists, Julian Voss-Andreae, a German-born sculptor now living and working in Portland, Oregon. In addition to sculpting, he has studied physics, mathematics and philosophy. His background in science has informed and influenced his career in the arts, leading to his creation of pieces such as protein sculptures, based on frames of a protein folding simulation, and a large-scale depiction of the carbon-60 molecule commonly known as a buckyball.

Of course, the microscopic subjects of Voss-Andreae's art are beyond what the human eye can perceive. But by creating artwork from his scientific perspective, he imparts tangible three-dimensional forms to these "invisible" elements that are all around us.

One of his most visually striking works is his Quantum Man series. These 3D sculptures – which can be found around the world from Portland to Zurich, Switzerland, to Sydney, Australia – are composed of thin vertical plates that, when viewed head on, bring to mind a person walking. But when seen from the side, the figure virtually disappears.

This artwork depicts a human figure as a quantum object. The sculptures' name is derived from quantum mechanics, a fundamental theory in physics that describes nature in the smallest terms of atomic and subatomic energy levels. You know things are infinitesimal when they're even tinier than the nanometer and submicron sizes that are common throughout our own semiconductor industry. All around us are forces – and poten-

tial energy sources – that are unseen. For example, ambient power can be collected from a wide range of common external sources including photons, geothermal heat and kinetic energy. The process of harvesting this energy has been used for decades. In the early days of radio, crystal radio sets were powered solely by the energy in radio waves received by a wire antenna. Today, one of the most widespread forms of ambient power collection is the photovoltaic panels that populate neighborhood rooftops and solar energy farms, converting solar rays into electrical current.

Ambient power can be harnessed to improve our human experience through applications such as mobile, wireless electronics. **The technology incubator Silicon Catalyst (<http://siliconcatalyst.com/>) helps many innovative entrepreneurs to get their ideas started on a business track.** One such start-up involves a group of imaginative young people working on technology that harvests body heat to power devices such as smart watches. (Matrix Industries) The principle is to leverage the difference between body temperature and the surrounding air; the larger the temperature disparity, the more energy is available.

And while the energy captured would be relatively small, the group believes it can channel that power in sufficient quantity to drive all of the functions on a smart watch. In theory, simply by moving around, a wearer could generate electrical power wherever he or she goes. The implications for IoT and wearable electronics would be dramatic, especially considering

that wearable sensors are estimated to be a billion-dollar industry (<http://electroiq.com/blog/2017/09/wearable-sensors-reach-their-first-billion-dollar-year-with-growth-coming-in-three-waves/>) and growing.

We live in the Age of Connectivity, in which everything from the people we know to the information that we want is no further away than the phone in our pocket or the smartwatch on our wrist. From the works of provocative artists to the emergence of self-powered wearable electronics, we are surrounded by ways in which technology contributes to human experience. Even if the microscopic linkage is not visible to us, everything is connected.

So the next time you are struggling to find a solution to a difficult problem at hand, perhaps think of the energy you can generate all by yourself. Or get even more abstract and try art. Outside-the-box approaches can open our eyes to things we don't ordinarily see.



*Judy Davies is the vice president of global marketing communications at Advantest, a Silicon Catalyst In-Kind Partner.*



**A CONVERSATION WITH ALBERT CHAI, FOUNDER AND CEO OF SILICON CATALYST PORTFOLIO COMPANY CLOP TECHNOLOGIES PTE LTD.**



Singapore-based CLOP Tech was established with the goal of Connecting the Lives Of People using technology, and hence the name “CLOP Technologies Pte Ltd”. Over this short period of time, we have grown to a remarkable scale, and will continue to grow to fulfill our promises to provide Gigabit Wireless to Everywhere, for Everyone.

**Q. PLEASE TELL ME ABOUT YOUR SPECIFIC ROLE/TITLE AND BACKGROUND.**

**WHAT INSPIRED YOU TO START THIS COMPANY? PLEASE TELL ME ABOUT YOUR STARTUP AND GOALS.?**

**A.** I have spent more than 8 years in A\*STAR working on advanced communication technology R&D. Inspired by Singapore Government’s commitment and leadership in building Singapore as a Smart Nation, I took this opportunity to do my part to promote and accelerate commercialization of A\*STAR technology. There is no other better way to make a difference than to have an all-hands-on effort to create a start-up for a technology truly design, build, and commercialize in Singapore. Being able to bring our technology to benefit people and “Connecting the Lives of People” has always been the vision of CLOP Tech. So far this has been a rewarding and enriching journey as we take on new business challenges and build our vision towards connecting the lives of people.

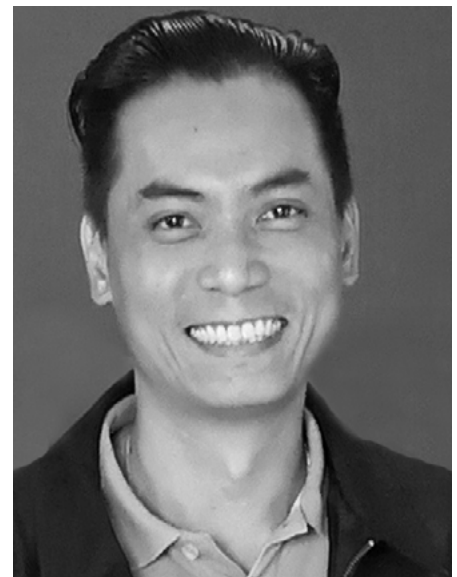
**Q. WHAT HAVE YOU LEARNED IN THE PAST YEAR?**

**A.** We started CLOP Tech slightly over 2 years ago in Singapore. We have gone through fundraising, building of the team, fostering business partnership and alliance, and creating business opportunities and applications for our customers, building our product,

and growing businesses beyond Singapore. Every phase is a new learning opportunity where we will face multiple challenges from both internal and external. The most rewarding experience is having opportunities to collaborate with the government and industry partners to validate our business solutions to solve their business needs, while fostering good business relationship and making friends along the way. I am proud to announce that my team have recently achieved our first flagship product launch recently. This marked a major milestone for my company achievement coupled with receiving customer orders for our product.

**Q. WHY ARE YOU PART OF SILICON CATALYST?**

**A.** At the point of starting the business, we chanced upon Silicon Catalyst through a mutual business partner and we decided to join Silicon Catalyst due to the wealth of in-kind partners and services in the accelerator program. Having experience in designing and taping out chipsets, I understood the challenges in getting access to these services, and they are vital in our business. We were unsure in the beginning as well, since Silicon Catalyst was new and established slightly earlier than us. We are one of their first portfolio companies. As time passes, we have grown together with Silicon Catalyst and benefited from that.



**Albert CHAI, FOUNDER AND CEO CLOP TECHNOLOGIES PTE LTD**

**Albert founded CLOP Tech in 2015 after spending more than 10 years of his career in R&D. Formerly holding a Department Head role in A\*STAR Institute for Infocomm Research, he was fully involved in the 60GHz high bandwidth wireless communication technology development since the project first started in 2009. He led the team in the ASIC chipset development and had successfully achieved silicon verification 60GHz modem design and prototype.**

## A CONVERSATION WITH SILICON CATALYST PORTFOLIO COMPANY ALBERT CHAI .. CONTINUED



### Q. WHAT ARE YOUR GOALS FOR 2018?

**A.** 2017 had been an exciting year for CLOPTech – product development phase. We are looking forward to 2018 as another greater year for CLOPTech filled with aspiring ambitions – flagship product launch, key customer engagements, entering mass production phase, development of next products, and more. We are preparing to enter new business opportunities and expanding our business to regional countries in Asia.

### Q. WHAT IS IT LIKE AS A STARTUP WORKING IN ASIA/ SINGAPORE WITH SILICON VALLEY?

**A.** Singapore has a very rich and vibrant entrepreneurship culture. You can see many world class partners incubating our start-ups, and many start-ups begun right here in LaunchPad at One-North Singapore. Singapore Government is committed to create a supportive eco-system for Singapore start-ups. CLOPTech is one of the first silicon solution-based start-up company in Singapore to benefit from this eco-system. Semiconductor business has much

higher financial barrier than other industry sectors. Being able to operate in Singapore and having business access in US is beneficial to CLOPTech in creating an international business branding. Silicon Catalyst helps us to establish CLOPTech presence in US and creates a foundation and landing spot for us to expand business into US.

### Q. WHAT RECOMMENDATIONS DO YOU HAVE FOR SEMICONDUCTOR ENTREPRENEURS?

**A.** Taking the first step out of your comfort zone into a situation full of risks and uncertainty was never an easy decision. Going from zero to one is the hardest part. You need to move fast, learn fast, and be packed with perseverance. Because, running a business requires very different skillsets from being an engineer or researcher. Equipment and software tools are expensive resources to own in the beginning. Therefore, being extremely resourceful in hunting for these resources is a vital part in our business. Lastly, having strong support from the family is also an important consideration. You will not be able to provide them with the same level of stability and attention. I am very fortunate to have the support of my family and the help and guidance of many good friends I made throughout this journey.



## EVENTS



**4/3/2018**  
**Semi Advanced Semiconductor Manufacturing Conference**

Saratoga Springs, New York  
 ASMC continues to be one of the leading international technical conferences for discussing solutions that improve the collective manufacturing expertise of the semiconductor industry. Solving the challenges presented by semiconductor manufacturing has been a combined effort by device makers, equipment and materials suppliers and academics.  
[Click here to register.](#)

**5/1/2018**  
**ChipEx 2018**

Tel Aviv, Israel  
 ChipEx2018, the largest annual event of the Israeli microelectronics industry, will be held in May 1, 2018 in Tel Aviv, Israel. The conference is produced by ASG Ltd. in cooperation with SIA, Semiconductor Industry Association and with Semi, the largest global industry's association.

**5/30/18**  
**European Conference on Integrated Optics**

Valencia, Spain  
 The conference focuses on leading edge research on integrated optics, optoelectronics and nano-photonics and gathers experts from academia and industry to show their latest technical results, and showcase their products and services.  
[Click here to register.](#)

**4/4/2018**  
**Silicon Catalyst Advisor Networking Event**

Mountain View, CA

**5/17/2018**  
**WIPDA Asia 2018**

Xi'an Shaanxi, China  
 WIPDA Asia 2018 aims to provide a forum for device scientists, circuit designers, and application engineers share technology updates, research findings, development experience, and application knowledge.  
[Click here to register.](#)

**6/5/2018**  
**PCIM Europe Conference**

Nuremberg, Germany  
 The conference addresses key issues in the field of power electronics, as well as the latest trends and future developments in industry and academia.  
[Click here to register.](#)

**4/19/2018**  
**GSA Silicon Summit**

San Jose, Ca  
 The theme for this year's event is New Systems Architectures Enabling Automotive and Internet-of-Things Markets. We have a great line up of speakers.

**5/20/2018**  
**The ConFab 2018**

Las Vegas, NV  
 The ConFab 2018 will take a close look at the new applications driving the semiconductor industry, the technology that will be required at the device and process level to meet new demands, and – perhaps most importantly – the kind of strategic collaboration that will be required. Here are six key trends we'll address in the conference that will have a huge impact in the near future  
[Click here for more information.](#)

**6/24/2018**  
**Design Automation Conference**

San Francisco, CA  
 DAC is the premier conference devoted to the design and automation of electronic systems (EDA), embedded systems and software (ESS), and intellectual property (IP).  
[Click here for more information.](#)



## IN KIND PARTNER INTERVIEW EAG



### Catching up with Aram Sarkissian at EAG

#### Q. WHAT'S THE HISTORY BEHIND EAG?

**A.** EAG began as Charles Evans and Associates in 1978 in the Silicon Valley as a material science laboratory service provider and supported some of the early semiconductor and technology companies. Over time EAG set up and acquired labs throughout the U.S. and overseas to create a much wider lab network adding more analytical techniques and serving a number of different markets. Beginning in 2006, EAG began acquiring companies with expertise in service areas that were more traditionally geared toward supporting early IC development and NPI in areas such as ATE test, FIB circuit edit, failure analysis and reliability. By 2009 we had acquired some of the leading companies in those spaces and the combination of these services constituted a comprehensive and unique commercial service offering. That stands today as our Engineering Sciences Division.

#### Q. IN WHAT WAYS IS EAG UNIQUE?

**A.** It's unique to have all the services we offer available as an integrated, one-stop for customers. In the classic IDM model, companies had everything in-house but few companies could continue to make the ongoing investments to maintain that structure. EAG has done the job of pulling

a number of these critical services together to bring high quality, rapid response support to even the smallest of companies. Coupled with our material analysis expertise, we have the most comprehensive range of services of any commercial lab.

#### Q. SO WHAT DOES A TYPICAL CUSTOMER ENGAGEMENT WITH EAG LOOK LIKE?

**A.** Well, it can vary quite a bit and that highlights the strength of our model. We really are an on-demand extension of our customer's resources which provides huge time to market advantages. In the case of a small startup, they likely have none of these specialized functions in-house and are even less likely to have the labs and capital equipment in place. So, for them we can provide everything they need from helping develop and bring up test, design and execute a reliability qualification plan and provide any failure analysis, debug and FIB circuit edit as they iterate thru the NPI cycle and beyond. For larger companies, we might complement what they already have in place. This might be simply supporting overflow beyond their internal capacity or might be providing services where they have elected not to have in-house support. As an example, a customer may have internal test and reliability but choose to work with EAG on all failure analysis

and FIB requirements where they do not want to make the ongoing investments to maintain those functions..

#### Partner Corner:

At Silicon Catalyst we spend a lot of time working with and introducing you to new startups and new technologies. But it's important to note that bringing the bold ideas of these startups to life requires additional expertise, capabilities and infrastructure that help enable and accelerate product development. Our portfolio companies are fortunate to have a number of Silicon Catalyst partners in place, standing ready to support them. We recently had a chance to catch up with EAG's Aram Sarkissian, who leads their Engineering Sciences Division, to learn more about their services and how startups continue to be a vital part of their business.



Aram Sarkissian  
General Manager, Engineering Sciences



## IN KIND PARTNER INTERVIEW EAG



### Catching up with Aram Sarkissian at EAG Continued:

**Q. GIVEN ALL THE LARGE SCALE M&A ACTIVITY IN THE SEMICONDUCTOR SPACE, ARE YOU SEEING LARGE CHANGES IN YOUR CUSTOMER BASE OR IN THE WAYS CUSTOMERS UTILIZE EAG?**

**A.** I tend to think of companies as collections of people who manage products and projects. I think on some level this is even truer as large companies become mega companies through consolidation. While the logos might change, the projects still need attention and support. In some cases, companies can utilize in-house resources to support newly acquired companies, but often they are overloaded themselves or simply do not have the right resources to support them. So, the need to partner with EAG is still there. Fundamentally, innovation is what is important for our business and we continue to see innovation and new products. Large semi companies are taking an even bigger role as VCs by also investing in and acquiring some of these new companies. As the proliferation of microelectronics continues to broaden into many more applications, we're seeing new customer companies who are adding microelectronic content into consumer, industrial, automotive, medical and a range of other applications. There can be many multidisciplinary challenges in some of those applications that make having EAG's breadth particularly helpful. It's exciting to see

some of these new products in their early stages.

**Q. WHAT IS SOMETHING READERS MIGHT BE SURPRISED TO LEARN ABOUT EAG?**

**A.** Your readers may not know or realize that we have a 24/7 full production test facility in house. As part of our NPI activity we support early ATE development with a large base of installed testers on our floor. We also have a number of probers, handlers and even a clean room environment for some of the image sensor products we run. Customers can ramp to production on our floor and we have all the production controls, drop ship and product fulfillment aspects you would expect from a production test facility. Combine that with flexibility to deal with complex test flows, challenging set up requirements and the tie to other EAG services, we have a pretty compelling offering. For customers running lower volume, special requirement, need ITAR certification or special IP consideration, we are a good fit and have a number of customers that rely on us as their production facility.

**Q. WHAT DOES BEING A SILICON CATALYST PARTNER MEAN FOR ENGINEERING SCIENCES AT EAG?**

**A.** At the heart of our DNA is a love to support customers and Innovation. We

love startups and we have had the pleasure to work with many of them. When we first connected with Silicon Catalyst, it was clear that they did too and in a short time they have done a lot to not only find and help guide some of the startups in their portfolio but also to bring those startups and partners together to explore new technologies, ideas and help continue to promote innovation.



## “Protecting your IP”

**On Jan 30, Silicon Catalyst held its first event of 2018 “Protecting your IP”, hosted at Silicon Catalyst partner Techcode and sponsored by Elegant Design**

The event was attended by entrepreneurs interested in understanding the How and When of protecting their Intellectual Property.

The panel consisted of 3 distinguished speakers; Mark White of White Summers, patent attorney Stephen Durant and David Smith, Chairman of TYNAX. They discussed not only the when and how of IP, but also the international challenges and requirements when it comes to protecting one’s Intellectual Property.

The session was interactive, engaging and informational as the speakers had a lively discussion among themselves. The attendees jumped in with a few

questions of their own extending the session to 9:00pm.

Questions ranged from how to protect your IP, what red flags to watch out for and what are the some of the international ramifications. In addition, they discussed what are some of the negatives of postponing protection, should the IP be disclosed, and a variety of other related topics.

There were many takeaways from the session for attendees who were appreciative to learn the world of IP and understand what they need to do to better protect their startups’ IP.

**As Steve Jobs said, “If protection of intellectual property begins to disappear, creative companies will disappear or never get started.”**

The session video will be posted soon on Elegant Design website.





## TSI SEMICONDUCTORS & SILICON CATALYST PARTNER TO BUILD ECOSYSTEM FOR STARTUPS

### ADVANCED SPECIALTY SILICON PROCESSES NOW AVAILABLE TO SILICON CATALYST PORTFOLIO

In recognition of the advanced innovations that semiconductor startups are delivering, TSI Semiconductors and Silicon Catalyst announced that Silicon Catalyst Portfolio Companies now have access to TSI Semiconductors' advanced exotic processes and custom CMOS technologies for the fabrication of their designs. This new partnership advances the ecosystem that is forming in support of the growing semiconductor start up community into territory typically available only to much larger companies.

Under the agreement, TSI Semiconductors will provide process libraries, development services, and mask sets to Silicon Catalyst Portfolio Companies at significantly reduced cost. This includes accessible space on scheduled MPW shuttle runs. TSI Semiconductors will work collaboratively with customers to integrate novel materials, unique architectures and devices with the ability to retain their IP in a secure environment.

"The advanced innovations we are seeing coming out of semiconductor companies today is surprising and impressive," said TSI Semiconductors CEO Bruce Gray. "We are heartened by the strong momentum that is building in this community with the support of Silicon Catalyst, and we are proud to contribute the unique technologies and local bay area presence of TSI to the growing ecosystem supporting these startup companies."

Silicon Catalyst COO Pete Rodriguez said, "The innovation in the semiconductor startup community is stronger than we have seen in years. They need and deserve access to world class technology, and TSI Semiconductors is delivering exactly that. Our new partnership with TSI Semiconductors will simply add up to more successful new semiconductor companies."

In the past 24 months, Silicon Catalyst has screened well over 100 start-ups from the U.S., Europe, and Asia. The 14 startups admitted to the incubator are developing innovations in LED, energy, silicon photonics, memory technology, wireless communications, and biomedical devices.

### About TSI Semiconductor

TSI Semiconductors is a world-class semiconductor technology development and production volume CMOS foundry company who is the ideal partner for a wide range of IC projects. Located in close proximity to our customers' design and engineering teams, we are driving innovation closer to the heart of Silicon Valley.

We empower our customers device manufacturing by providing unprecedented on-site access to our fab floor and equipment. In addition, with our flexible technology development services, customers accelerate learning cycles that get their products to market faster through greater control and protection of their technology and IP. At our 8-inch Roseville, California site, we provide an array of versatile process technologies that include analog/mixed-signal, deep-submicron, high-voltage BCDMOS, and solutions such as novel materials structures and devices. Specialized foundry services include automotive-grade, high-voltage BCDMOS, and technology capabilities utilizing novel materials, structures and devices.

Visit its website at <http://www.tsisemi.com>



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