

MEMS, Microfluidics and Microsystems Executive Review

Industry overview: a MEMS foundry perspective



As the **MEMS marketplace** continues to evolve at a rapid pace, many **new and exciting trends** are taking shape. To provide some perspective, we recently spoke with **Nancy Fares**, Micralyne's new President and CEO. In this detailed interview, Nancy provides **unique insights** on the **main current trends** in the MEMS marketplace, venture capital, most promising MEMS startups as well as potential future **"killer apps"** for MEMS technologies.

MEMS Investor Journal: How has the MEMS industry changed over the years? What are the main trends now as opposed to ten years ago?

Nancy Fares: Ten years ago the focus in the MEMS industry was on development and finding applications for the products. Micralyne is a good example of this – ten years ago we had a tool box of process capability and we used this tool box to develop both products and processes for our customers. The majority of our revenue came from development. Product design resided with our customer and process flow resided with Micralyne. MEMS was a small undefined niche market and now many semiconductor companies look at MEMS as a potential field for diversification.

Now MEMS is an enabling technology – for example, gyroscopes and accelerometers for the gaming and automotive industry. The focus in these industries now is yield, cost, standardization and process controls. Pioneers in the industry are still the market innovators and they are moving to new markets; for example, Kurt Peterson, Steve Nasiri with InvenSense, Janusz Bryzek with Jyve to name a few.

MEMS growth is undeniable. Formation of major companies such as Sensata (out of TI), Freescale (out of Motorola) as well as InvenSense which is at the IPO stage is a strong indication of this growth. MEMS products are also starting to garner the public's attention. With companies foraying into the consumer electronics space, MEMS is no longer an academic art and curiosity that it once was.

MEMS Investor Journal: How has MEMS manufacturing changed?

Nancy Fares: The MEMS foundry business has also matured and Micralyne is a good example of this. The majority of our revenue now comes from production. Development is still an important component of Micralyne's business but as an avenue to future production. Micralyne has moved from a tool box of process capabilities to process platforms – for example, our optical MEMS platform and our wafer level packaging capability.

Overall, the focus on the foundry space has shifted from strong development teams to strong, robust manufacturing teams for front-end, back-end, and testing. Development is still critical but quality systems, supply chain, and throughput become the major areas of growth as companies begin to ramp towards higher volumes.

Also, as the foundry market has matured and VC funding decreased significantly, most new MEMS product companies are following the fabless model. Some system companies with MEMS fabs are looking to outsource their MEMS production.

MEMS Investor Journal: How have MEMS pricing trends shifted over the years?

Nancy Fares: Demand for low price and high volume consumer electronics is really driving the MEMS industry into new directions. Industry focus is on 8-inch production and wafer level packaging; these are the enablers for low cost production. Micralyne is now on 6-inch production and 8-inch lines will be needed in the next 3-5 years.

MEMS Investor Journal: What do you see as the top three trends right now in the MEMS marketplace?

Nancy Fares: The drive in the industry is cost reduction for the overall device cost. One of the enabling technologies to reduce the device cost is new packaging technologies such as wafer level packaging. The other factor influencing device cost is die size. The trend has and will continue to be smaller die sizes. The implications are – finer geometries and tighter CD controls.

There is also now heavy reliance on the foundries to provide innovation. As fabless companies begin to mature, their customers are demanding more and faster innovation.

Another trend is that consumer electronics are driving MEMS investments and volume. MEMS devices have matured to the point where they can be low enough in price to chase the biggest volume markets. Some companies are selling fully packaged components in the \$0.60 - \$1 range. If you look at the emerging markets, they are mostly linked to consumer products; for example, fuel cells and RF MEMS.

MEMS Investor Journal: Which MEMS applications offer the most promise for the future?

Nancy Fares: Medical devices for life sciences, microfluidic devices for medical applications, three-axis MEMS gyroscope devices, MEMS devices for VOA. Also, RF MEMS might be another explosive area of growth which would bring another level of miniaturization to consumer electronics.

MEMS Investor Journal: Energy harvesting is a hot topic these days. What are your thoughts about it? Are there really some "killer apps" for it?

Nancy Fares: MEMS energy harvesters and MEMS fuel cells are interesting. The potential to power sensors without external sources creates enormous opportunities. However, these devices are still in the early stages of development and will require significant time and investment before they can be commercialized.

MEMS Investor Journal: What's your advice for venture capitalists investing in MEMS technology companies? What should they look out for?

Nancy Fares: Technical and financial due diligence. A teardown and thorough research of the technology and competitors should be performed. There are many times when you run into companies with great technical designs but no path towards the commercial price point they desire.

Another piece of advice is to really understand the MEMS market. Yole has been quoted saying that the average time to market for a MEMS product is 4 years and \$45 million and that's with an experienced team onboard. Exit strategies with timelines less than 4 years are extremely optimistic.

Also, patience for financial return is key. For example, the financial impact of some of the MEMS application such as implantable bio MEMS can be significant, but product cycles are not the same as consumer electronics business. So, in this case, investment has to be for a long period of time and product cycles can last for years and up to decades.

MEMS Investor Journal: What advice do you have for emerging MEMS companies and their founders?

Nancy Fares: Pay close attention to the supplier you choose. Look past the initial development costs and more towards the development experience – you want a supplier with a proven track record of getting to market and supplying to major customers.

MEMS is not CMOS, so “one product, one process, one package” remains the norm. If the product is new and has never been made before, you will (!) have issues, and you need a supplier that has the development pedigree to get past those issues.

MEMS Investor Journal: What are the top three reasons why MEMS companies fail?

Nancy Fares: There are a number of reasons why MEMS companies fail. For example, some companies have a good idea but their products are not customer or market driven. Also, inadequate market research for competing technologies as well as strengths and weaknesses. Funding is another issue – not appreciating the time and cost to take an idea from the lab to production. Some MEMS startup companies went out of business because they ran out of VC funding and had a high cash burn rate. Another point of failure is ignoring the importance of packaging and assembly which could affect

the performance and cost of the finished product.

MEMS Investor Journal: What are the top MEMS startup companies that you believe have the highest chances of success?

Nancy Fares: InvenSense and SiTime come to mind. InvenSense is a young MEMS company that has grown significantly in the last 2 years. The rate of growth is impressive compared to traditional MEMS growth cycles.

MEMS Investor Journal: What are some of the most interesting MEMS based products that you've seen recently?

Nancy Fares: Implantable sensors, IR vision, DNA sequencing, MEMS based audio speakers. I think the life science products in general are interesting because they have the potential to change our quality of life as well as the efficiency and cost of healthcare. Also, from a timing stand point, we will be seeing more of the life science MEMS put into use in the next 5 years.

MEMS Investor Journal: As the incoming CEO, what are your main goals for Micralyne for the rest of the year and 2011?

Nancy Fares: Our goals are not much different from many companies in our industry – serve our customers better, be more profitable, invest in our future and grow. There are multiple opportunities for growth driven by new MEMS applications, more fabless startups as well as becoming the foundry for existing system companies who used to manufacture their own MEMS.

MEMS Investor Journal: How does Micralyne differentiate itself from other MEMS foundries?

Nancy Fares: We are a pure play foundry – we do not offer products, we offer services. We also have development and production under the same roof which makes the transition from prototype to production easier. Our experience allows us to develop innovative solutions to reduce the cost of the manufactured parts with increased functional performance.

MEMS Investor Journal: How has the recession and slow economic growth environment affected Micralyne? How is your business activity now?

Nancy Fares: Like most other companies in the MEMS industry Micralyne experienced a downturn during the January to March time period of 2009. This downturn continued through 2009.

This year the picture is different. We are seeing recovery in our manufacturing business driven by existing products growth. We are also seeing more companies invest in engineering services for new MEMS applications.

Nancy Fares joined the Micralyne team in 2010 as President and CEO. With her comes an extensive education – Bachelor of Electrical Engineering and a Master’s in Business Administration from the University of Texas and a Master’s in Science in Telecommunication from Southern Methodist University. In addition to her formal training she also brings diverse MEMS industry experience. Specifically, Nancy has held several key roles within the Texas Instruments Corporation. Her most recent position, General Manager in the TI DLP Division, oversaw the DLP Cinema and DLP HDTV business units that enabled impressive growth of the 3D movie genre.

Nancy is proficient in bringing new technologies to market through her leadership and customer focused strategies. Within her role she is looking to leverage Micralyne’s strength in engineering, manufacturing expertise and the company’s continued customer focus to ensure each are successful in reaching project goals as well as market growth potential.

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