Interview with Jim Tassone of Uni-Pixel Displays

James A. Tassone joined Uni-Pixel Displays as chief financial officer in August of 2003. Prior to joining the company, he was the founder, managing director, and CFO of Mindwave Research, Inc. where he remains on the board of directors. Early in his career, he was with IBM, Digital Equipment Corporation and Comdisco, Inc. before joining market research leader DataQuest/Gartner Group. After Gartner Group, Tassone became managing director at IntelliQuest. He left a research company start up he launched under CMP Media (Reality Research) to found Mindwave.

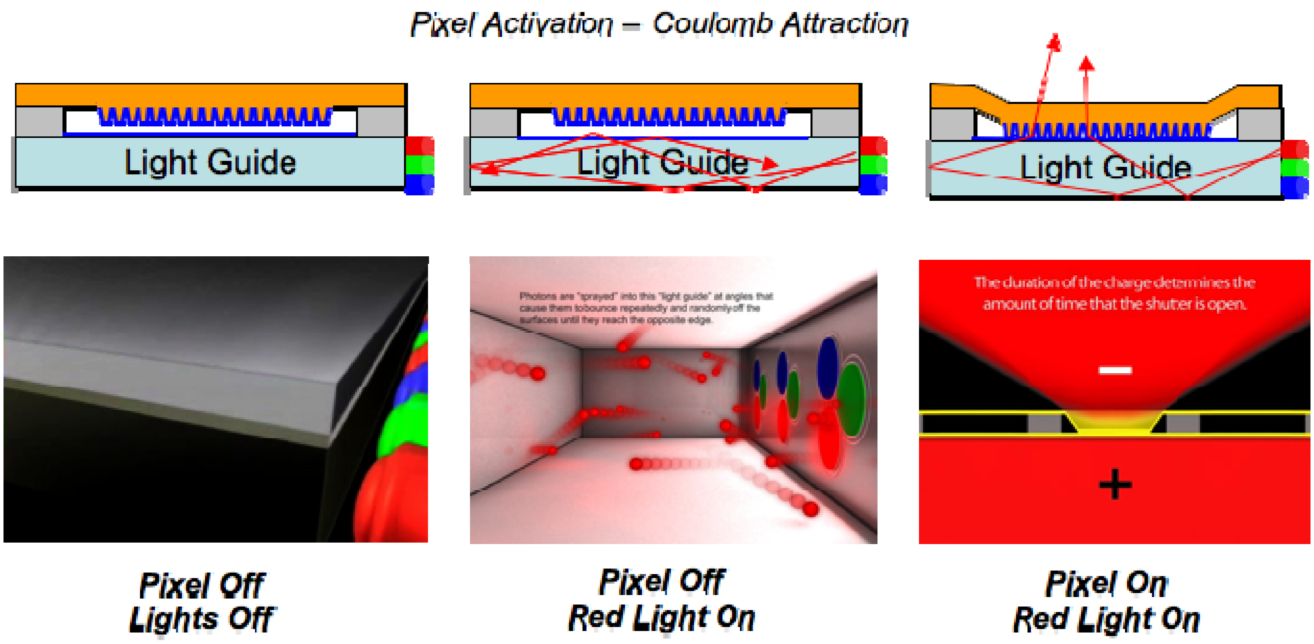
We haven't heard too much lately from Uni-Pixel. Tell us about what the company has been up to. After demonstrating our first TFT and direct drive based TMOS prototype systems during SID last year, we have been optimizing the sub-systems and working on expanding our efforts with our development partners. We have broadly expanded our thin film development efforts which have yielded a number of outstanding results. This includes the first product within our Opcuity Performance Engineered Films family which is ready to enter the market. We have completed a Joint Development Agreement with our first display panel partner and we have developed a unique conductor patterning capability using an inkjet process that has a wide range of applications.

Can you describe these technologies in more detail? The core technology is our display architecture which we call "TMOS" which stands for Time Multiplexed Optical Shutter. It is a polymer MEMS system that leverages the frustration of Total Internally Reflected (TIR) light as the means to transmit light from edge mounted LEDs through a light guide to the viewer. In summary, we sandwich a polymer membrane between two sheets of panel glass to form individual drum like structures as pixels. When the drum head oscillates into contact with the light guide glass, light is coupled out to the viewer. As a unicellular "unipixel" system, each pixel emits the full color spectrum through field sequential (time multiplexed) color. This eliminates the need for color filters and reduces the TFT count by 2/3 as there are no sub-pixels in the panel. We also eliminate liquid crystal, both vertical and horizontal polarizers, and replace the backlight unit with our edge light assembly which injects light directly into the panel glass.

Our Opcuity Performance Engineered Films leverage a common set of unique capabilities that we have developed. The first of these is the ability to pattern precision geometric microstructures on the surface of a thin film. These optical microstructures are between 2 and 10 microns tall with precision edges and faces. We have developed an inkjet process that allows us to pattern conductors around these structures on the film. We have also developed unique capabilities to modify the surface energy properties of the films to accomplish various beneficial results. When these three capabilities are combined with our optical expertise and engineering the result has been a family of film products that are truly unique and can support unique applications.

Are your development efforts focused on flexible display solutions, or do you plan to transition from fixed substrates to flexible substrates over time? We plan to transition over time. We feel very comfortable that once we have optimized our solution on a fixed substrate, it will transition to flexible substrates. We are tracking the work being done today in flexible displays to determine if it may benefit our efforts immediately. That being said, both of our unique thin film capabilities were developed for roll to roll processing. So our model is to produce rolls of our Opcuity films for the specific applications which can include flexible display implementations. One very interesting aspect of our work that we developed for our TMOS specific films is the conductor patterning technique that we use for our Opcuity Active Layer film. Using our unique approach we can pattern conductors on thin films at trace widths of 3 to 5 microns using an inkjet processing technique. In a recent planning session with a number of industry experts, a roadmap was presented that showed the industry attempting to reach this goal for a roll to roll processing environment in the next 5 to 7 years. We stood up and said, "We can do that today". As a result we are now pursuing a project to bring this capability to broader industry applications such as multi-layered printed flexible circuitry and micro-fluidics. This also will allow us to be able to use it to produce our Opcuity Active Layer Film for TMOS in a roll to roll production environment. Beyond that I believe that it may also find its way into other flexible display applications.

You have claimed "that TMOS will outperform OLED, plasma and LCD technology in every measurable dimension". That's a pretty bold claim! Can you back it up? When we first made this claim, we relied on our models to support the performance that we believe could be achieved. We have since built prototypes and conducted detailed empirical testing on every aspect and are still confident that TMOS will be the best performing display architecture in the industry in brightness and the lowest in power consumption. We have also physically demonstrated frame rates of over 650 frames per second, which we are absolutely sure will allow image quality beyond all others.



Display cross-section: pixel off represents no charge differential between conductors; pixel on represents a charge differential between conductors (+/+, +/-, -/-). Note that layers and deformation are not to scale. The combined layers on the light guide are less than 15 microns thick.

You also claim that "Uni-Pixel technology will work in something as small as a pocket calculator with displays less than an inch... and will also fill a family room with TV images as large as 110 inches." What markets are you targeting as the most likely initial adopters of your technology? We have aligned TMOS manufacturing processes to be completely compatible with existing LCD fabs so our panel sizes will be governed by the generation of LCD fab we are implemented into and its glass handling. Eventually we would hope that we can transition the largest fabs to TMOS from LCD to achieve very large panels. Initially we are working on smaller size panels where our low power consumption attribute can extend battery life in hand held devices while providing much brighter output making them direct sunlight readable.

What are the biggest challenges facing Uni-Pixel Display in terms of developing solutions appropriate for the flexible display market? Time and resources.

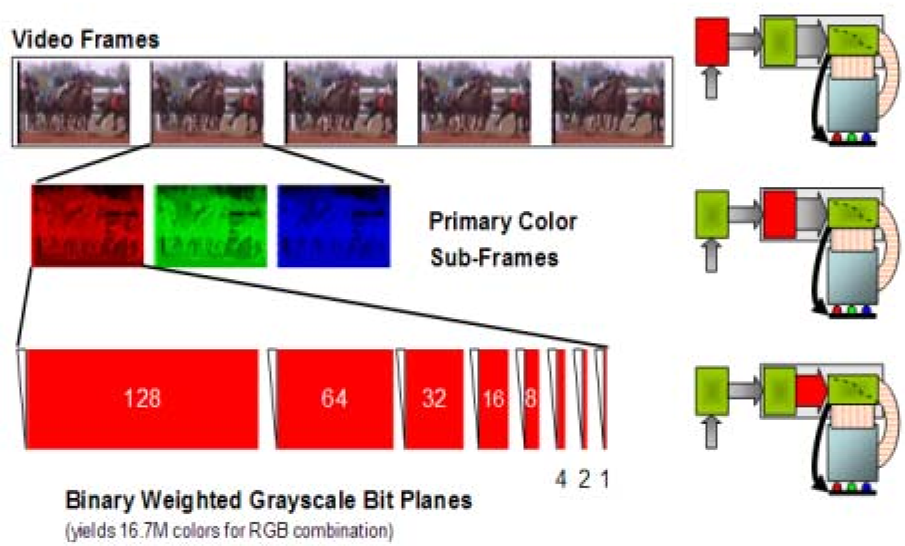
Field sequential color is sometimes criticized due to color break-up issues. What are you doing to minimize such concerns? First and foremost our extremely high pixel speed (less than 2 micro-seconds) allows us to burst mode our sub-frames at rates that overcome breakup. Secondly we have filed patents on methods and algorithms that allow us to take full advantage of this speed.

Tell us about your intellectual property position. We have surpassed 118 patents issued or filed and still have a backlog of over 50 new innovations that we are processing our way through. Again, time and money are the limiting factor for us to continue this ramp.

Does your business model assume licensing to established display companies, or are you hoping to manufacture display systems yourselves? We will license our display architectures, designs, and IP to existing panel manufacturers and eco-system partners in various sub-systems like light injection and drive control circuitry, and to supply the Opcuity Performance Engineered Film that makes TMOS work.

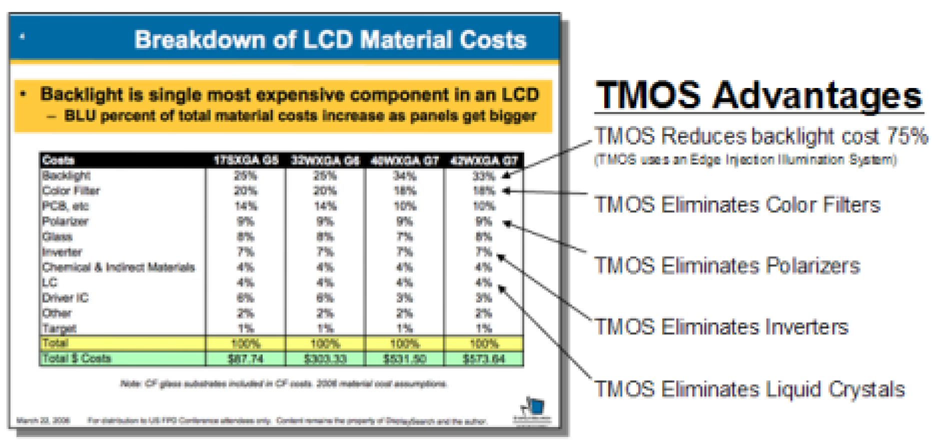
When can we expect to see further public demonstration of your technologies? We expect to make announcements in the near future specific to TMOS but do not have firm dates to announce at this time. We are in the process of distributing test samples of our Opcuity Finger Print Resistant (FPR) Film for Touch Screen panels with its expected entry into the market in the next few months. Opcuity FPR serves as a protective cover for touch screen panel devices that also prevents fingerprinting and smudging. Beyond that we have a few other Opcuity film designs that we expect to announce and demonstrate over the next year.

Your technology also relies on field sequential color. Any interesting breakthroughs in this area? The speed of the LEDs and the TMOS pixels gives us the ability to overcome ghosting and rainbow effects that other field sequential color (FSC) architectures have had trouble resolving. The TMOS architecture provides many differing methods for achieving both billions of colors and an extended color gamut while at the same time eliminating typical FSC artifacts. Uni-Pixel has several patents, filed and issued, that are specific to FSC generation in a TMOS system.



What are the practical limits of your technology in terms of resolution? We anticipate meeting 300-400 ppi and will be able to push the resolution higher if required. TMOS, which has a single pixel architecture generating the entire color spectrum, holds a distinct advantage over LCD, OLED, and plasma displays which require three or more sub-pixels for each pixel.

You characterized your TMOS solution as a way the TFT LCD industry can reduce costs. Please be more specific. The TMOS display panel manufacturing requirements are a subset of LCD panel manufacturing requirements. TMOS has a reduced Bill of Materials (up to 50% materials reduction for the foreseeable future) and provides a significant reduction in LCD manufacturing process steps. The LCD manufacturing industry can reduce costs as well as increase the performance levels of the flat panels they produce by building TMOS displays.



(LCD panel manufacturers can achieve a > 50% reduction in materials cost by switching to a TMOS manufacturing approach)