ELECTRONICS REPORT
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ET TRENDS

BUSINESS & MARKET NEWS

Tessera has clearly targeted the opto packaging field with their latest acquisition of Eyesquad, a developer of micro-imaging products. The late 2005 acquisition of Shellcase also provided opto packaging technology. Eyesquad's technology allows cellular phones with cameras to provide features found today only in digital cameras. The features include improved image quality, continuous optical zoom, built-in auto-focus and a close-up imaging capability. These features can be enabled without changing the cellphone camera's lens. Nokia and Samsung are testing the technology and looking to integrate it into future products. Other applications suitable for the company's products and technology include barcode scanners, endoscopes, and various security applications for miniature cameras. Tessera is expected to sell licenses for the newly acquired technology to makers of image sensors, lenses and digital cameras.

MS-MEMS - Microsoft Research's TechFest 2007 opened with the company's annual showcase of research projects touting more than 100 innovations. Although most of the company's developments are in the software realm, Microsoft Research said its hardware devices group is currently building MEMS devices in an effort to build cheaper flat-panel displays with high resolution. MEMS technology is currently gaining momentum use in a bevy of entertainment products, including Nintendo's immensely popular Wii gaming console.
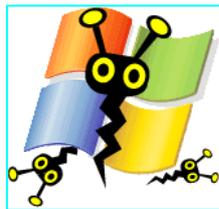
Medical Electronics - **Philips** and **Intel** plan to launch a wireless, handheld device to assist doctors and nurses in recording and storing patient information. [More and more of the giants are moving into the medical electronics sphere]. Philips is already one of the world's largest makers of medical equipment, but Intel is a newbie. The device, with touch screen and digital camera, has numerous uses. Key attributes: reduce medication errors, enable positively identify staff and patients, fill out charts, capture vital signs, write up reports and validate blood transfusions, as well as (provide) the ability to closely monitor specifics such as the healing of wounds. Medical professionals would use the devices to relay data to and from a patient's file on the spot. Perhaps most importantly, it will be "medical grade compliant". It's easy to sterilize because it is sealed and that's important because in many wards, sanitation rules put many doctors' personal digital assistants off limits. The product is due in Q4-2007 but price has not been set. However, Intel and **Motion Computing** are offering a $2,200 device for health. There is a work force of 12 million people in healthcare in the United States alone.

MATERIALS

Henkel India - Henkel is expanding **solder paste** manufacturing capacity in India. Henkel is quickly moving forward with its developmental targets and has confirmed that it will expand its existing plant in Pune, India to incorporate a solder paste blending facility for its Multicore brand solder paste products. The new addition will be dedicated to both tin-lead and lead-free solder paste blending specifically for materials destined for the Indian electronics market and will be operational by October 2007. The 38,000 square foot Henkel facility, located just outside of Pune, India, is ISO 9001 and ISO 14001 qualified and has been operational for over 17 years, producing Loctite® brand adhesives for the industrial and automotive markets. The new SnPb and Pb-free solder paste blending facility will necessitate the hiring of additional personnel to support the operation and Henkel projects that all of this plant's capacity will be earmarked for the India region.

Tin Running Low? A RoHS Effect? - China, the world's biggest producer of tin, may cut exports of the refined metal by 10% this year, further depleting global stockpiles that are already at their lowest since November 2005. Tin rose to its highest price in at least 17 years in London. China's exports of tin, used to solder electronic components, dropped 12% in 2006 to 19,000 metric tons on rising domestic demand and higher export taxes. Tin prices have climbed to record highs in the past year on concern about reduced supply from Indonesia, the world's second- biggest producer. Consumption in China, the world's fastest- growing major economy, is also rising as the country uses more of the metal for soldering microchips. Global tin consumption expanded 9 percent in 2006, according to ITRI data. Demand rose to 360,000 tons from 330,300 tons in 2005, helped by electronics manufacturers increasing the tin component of solder to substitute for lead, a poisonous metal. Tin for delivery in three months on the London Metal Exchange rose $300, or 2.4 percent, to $12,625, at 11:38 a.m. local time, the highest in at least 17 years. Earlier, it traded at $12,750, above the previous high of $12,500 recorded on Jan. 24. The metal has gained 59% in the past year as inventories dropped by a third.

TELECOM NEWS

Wi-Fi Momentum - More than a Billion Wi-Fi Chipsets to Ship in 2012 per ABI Research. During 2006, the Wi-Fi semiconductor market shipped just under 200-million Wi-Fi chipsets, and reached over 500 million chipset shipments cumulatively. Around the middle of 2008, the industry will have passed the 1-billion mark for cumulative chipset shipments. There will be well over 1-billion chipsets shipped in 2012 alone, with cellular handsets and consumer electronics accounting for about 70% of that total. Cellular handsets and consumer electronics were always the most important end products for Wi-Fi chipset vendors to focus on and this will continue.

WiMAX Wars - The battle is growing between cellular technology and WiMAX that may decide which will deliver multimedia content to mobile consumers. Bandwidth for delivering multimedia in wireless networks are growing very rapidly toward 5 and 10Mbit/s; about a 20X factor than what you can routinely get today. The choices seem to be an evolution of existing cellular or a newer one new technologies like WiMAX? There are serious shortcomings in the U.S. wireless network with

dropped calls and holes in the coverage. Anyone who delivers a reliable network will have a significant advantage. Coverage is a question of economics. WiMAX represents a dislocation, a new way of doing things, which may make it more cost-effective to give good coverage (Electronic News).
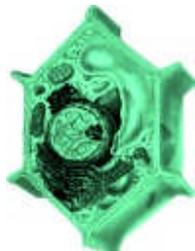
How Low Can You Go - The latest handsets for cost-sensitive markets in China and India have a **bill of materials close to $25**, an all time low. The voice-only GSM Motorola MotoFone F3 and the Ningbo Bird hit new lows in total parts counts as well. Motorola and Bird use highly integrated chip sets from Texas Instruments and Infineon, respectively. The handsets use fewer than 10 chips. The number of small active and passive discrete devices approach 150 per handset. The reduction in hardware cost and component counts have been accomplished primarily through the use of highly integrated chipsets. Reductions in die area for both memory and non-memory IC components and reduced RF passive counts are contributing to the lower hardware BOMs realized by both Motorola and Bird. The Moto phone uses a flexible display from startup E-Ink that delivers high contrast images and is readily readable in daylight. The display is more rugged due to the flexibility and it adds a bit of a cool factor to it," he added. The Moto phone uses only one memory chip, a 2 Mbyte NOR flash device; no SDRAM or PSRAM. The latest handsets effectively mark a third generation of phones aimed at emerging markets. The second generation saw models with bills of materials that dipped below $30. They included the Moto C113 and C113a phones as well as a model from Nokia. Those phones typically had about 14 chips and about 200 small active and passive discretes.

TECHNOLOGY

Bolt-on Germ Sensor? - Yale University developed a virus-sized sensor that could be incorporated into conventional microchips to produce instruments able to diagnose diseases with a single drop of blood, detect cancer cells and measure immune response. They claim it's the first nano component that can be integrated directly into microelectronic systems. The sensors might even be implanted in the human body to deliver medicine, monitor body functions, or defend the blood stream. The device has been patented to Yale. Yale was able to use a conventional wet-etch lithography process to fashion the ultra-small device. Yale perfected a way to shape nanoscale components, a process of nanowire sculpting - a molecular chisel. The resulting devices are essentially very sensitive transistors tuned to be sensors. The sensors are tagged with receptors or molecules that connect to target pathogens or other proteins. A slight difference in voltage can be measured, quickly revealing the presence of the target molecules. They envision placing a huge array of sensor devices tagged with an enormous variety of molecules on a single chip. A drop of blood could then be used to diagnose hundreds, thousands or millions of conditions. Eventually the sensor circuits might be implanted in patients to monitor glucose, measure kidney or liver function, and many other parameters, and to regulate a subcutaneous pump containing drugs, Reed said. Because the sensors are produced conventionally, they can readily be incorporated into microchips. *[OK, but I want to know how the easy connection to an IC is created or is this just another, "Here it is, you industry guys figure out what to do with it?"]*

Printed Electronics - Most industry professionals agree that roll-to-roll (R2R) processing must be implemented on the factory floor for the emerging flexible thin-film, organic, and printed electronics markets to flourish. Thin-film photovoltaics, OLEDs, and RFIDs are already in pilot or

volume production using R2R techniques. But for the manufacturing of large-area and conformable displays, paper-like e-books, and high-performance solid-state lighting to take place, it remains an open question whether inkjet, thermal laser imaging, or other printing technologies; optical, imprint, or digital lithography; adapted semiconductor and LCD processing methods; inorganic or organic material; or a combination of the various methodologies and chemistries will be leveraged into successful, scaleable R2R approaches. R2R, long practiced in the flex circuit industry, offers lower cost of up to 50% compared with batch-processed components. Thin films reduce the cost of semiconductor materials, continuous fabrication increases utilization and reduces production costs, and application of industrial processes simplifies production while providing high manufacturing rates. Like the early flex industry, everything has to be custom built and this slows development. Such equipment includes self-aligned imprint lithography (SAIL) system. This high-resolution tool, along with stamping, mastering, and other proprietary technologies, has allowed HP (with its partner PowerFilm Solar) to build what he claims is the first flexible TFTs (Thin Film Transistor) and active-matrix backplanes made fully with R2R processes. For R2R processes to be consistent, efficient, and high yielding, there must be reduced contamination and defectivity levels, precise endpoint control, very high uniformity, subnanometer-level surface roughness, and assured reliability. HP Labs, for their amorphous-silicon TFT process, uses interferometry to assess the endpoint of back-channel etching and fluorescence techniques to monitor and control the thickness of the polymer mask etch. Surface roughness is still an issue with flex and is not good enough for making transistors according to Xerox's PARC group. The roughness average needs to be a few angstroms, but that plastic substrates remain 5 to 10 times rougher than glass. Dan Gamota *[our old friend from underfill days]* of Motorola, which has produced more than 60 miles of printed electronics and is close to getting dielectric layers 1 to 5-microns thick, believes that the key challenge facing printed electronics is quality control and characterization on rolls many hundreds or thousands of feet long. "How do you check individual transistor device mobility on 2000 feet of film?" *[Printed Electronics is getting closer, and will have a long future, but could remain a niche technology - see Feb. 07 CircuiTree]*

IP

Rambus Ambush Conclusion - FTC Limits royalties for Rambus Designs - The Federal Trade Commission finalized its ruling that Rambus Inc. violated antitrust laws, imposing limits on the royalties the memory chip designer can charge. The FTC's final opinion provides the sharpest criticism to date against Rambus. The order said Rambus violated federal antitrust laws "by deliberately engaging in a pattern of anticompetitive acts to deceive an industry-wide standard-setting organization, which caused or threatened to cause substantial harm to competition and consumers." Legal experts said it would set an important precedent for the broader technology industry. The case hinged on whether Rambus illegally obtained a monopoly in the 1990s when it secured patents for two popular types of memory used in personal computers. Rambus was accused of failing to disclose to an engineering council that its patents had been incorporated into an industry standard regarding memory technology. The FTC also required the company to hire an agency-approved compliance officer "to ensure that Rambus' patents and patent applications are disclosed to industry standard-setting bodies in which it participates." The ruling bars Rambus from collecting or attempting to collect more than the FTC-mandated maximum allowable royalty rates from companies still using older DRAM (dynamic random access memory) technology licensed from Rambus. The nearly five-year-old case brought by the FTC, the agency that investigates allegations of unfair competition or business practices, has battered Rambus' shares for several years. Now that

the FTC has laid the legal groundwork, future cases attacking "patent ambushes" at standards organizations should be able to move more quickly and obtain powerful remedies before the technologies at issue are superseded in the marketplace by next-generation devices.

New Stamping/Plating Process for Metallic Interconnects - Researchers at the University of Illinois at Urbana-Champaign have developed a simple and robust electrochemical process for the direct patterning of metallic interconnects and other nanostructures. They have developed a simple and robust electrochemical nanoimprinting process with solid-state superionic stamps (S4). The new approach can be a stand-alone process or a complement to other nanofabrication techniques for creating chemical sensors, photonic structures and electrical interconnects. The S4 process uses a patterned superionic material as a stamp, and etches a metallic film by an electrochemical reaction. In superionic materials, metal ions can move almost freely around the crystal lattice. These mobile materials can also be used in batteries and fuel cells. The S4 processing first places patterns on photoresist, followed by metal deposition and subsequent etching to create high-resolution metallic nanopatterns in a single step, potentially reducing manufacturing costs and increasing yields. The S4 process begins by carving the desired pattern into a stamp made of superionic material, such as silver sulfide, using focused ion beam milling. The stamp is then placed on the substrate and a voltage is applied. This produces an electrochemical reaction at the contact points of the interface. The reaction generates metal ions, which migrate across the interface into the stamp. As the reaction continues, the stamp progresses into the substrate, generating features complementary to the pattern on the stamp. The stamp acts like a sponge, soaking up metal ions. The most difficult step in the S4 process is making the stamp extremely flat and smooth. Currently, the resolution for patterning details is 50-nm. As better tools for engraving the stamps are developed, we will achieve finer resolution. *{Plating Chemistry Opportunity??}*

GLOBAL NEWS

India Phone Mfg. - Sony Ericsson Mobile Communications will get its GSM mobile phones made in India by contract manufacturers, starting with entry-level color phones and mid-level phones with music. Annual production of its phones in India will reach 10 million by 2009. The phones will be made by the local operations of Hon Hai Precision Industry Co., which uses the brand name Foxconn, and Flextronics. These companies already make phones for Sony Ericsson in other locations. About two-thirds of Sony Ericsson's phone production worldwide is met by contract manufacturers. Flextronics will start producing Sony Ericsson phones in the second quarter, with Foxconn beginning manufacturing about two to three months later. Sony Ericsson joins a number of mobile manufacturers, including Nokia, that are manufacturing in India or contracting Indian manufacturers, to meet the country's booming demand for mobile phones. India's largest telecommunications service provider, state-owned Bharat Sanchar Nigam, insists on local manufacture of equipment it procures. Making the phones in India will help Sony Ericsson reduce costs, and offer handsets at a lower price. The phones will offer customized features for the Indian market, such as local content and customized keypads. India is adding over 6 million mobile phone subscribers each month. The number of wireless subscribers grew 97 percent from 75.94 million at the end of December 2005 to 149.5 million subscribers at the end of last December, according to the Telecom Regulatory Authority of India in Delhi.

India's New Semi-conductor Policy - The Indian government's new semi-conductor policy is expected to attract multibillion-dollar investments, create more jobs and build an eco-system to make the country a manufacturing hub for chips and electronics goods. The Indian Semiconductor Association (ISA) termed it a milestone stating that the pro-active initiatives of the government would lead to huge investment flows into India in the coming years. The investment could be in the order of $6-10 billion in the semi-con industry by 2010. The policy seeks to offer a host of incentives such as capital subsidy of 25% for 10 years to set up fab facilities and other high-end manufacturing units outside the special economic zones (SEZ) and 20% in the SEZs, with exemption from countervailing duty (CVD) of 16% on capital goods.
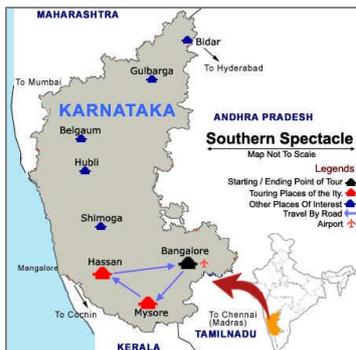
Vietnam - Hon Hai in China - The company plans to build **5 industrial parks in Vietnam**. Foxconn is the registered trade name for Hon Hai Precision Industry Co., Ltd. Hon Hai, Taiwan's top electronics parts maker, is scheduled to build 5 industrial parks in Vietnam in the coming years. Hon Hai's investment in Vietnam will be centered in the country's capital Hanoi and Ho Chi Minh City, Two industrial parks in these cities would be constructed this year to house production facilities for all of the group's product lines. Construction of the remaining three will get under way later. Hon Hai last month disclosed its plan to invest $1-billion in building an industrial complex in Hanoi, which would be mainly used for the production of consumer electronics and computer parts.

India-Mart - Bharti Enterprises (mobile phones) and Wal-Mart plan to start a chain of retail stores in India. It will invest up to 2.5-billion dollars in the project by 2015. After revolutionizing the Indian telecom sector, retail will be the next big focus area for them. Bharti Enterprises owns the country's top private phone firm and will open stores in all Indian cities with a population of more than one million. India's fast growing affluent middle class estimated as high as a third of its 1.1 billion population spends about 300 billion dollars annually on retail shopping, according to an estimate. That figure is expected to double by 2015, according to consultants PriceWaterhouseCoopers. Organized retailing, however, makes up only three to five percent of India's retail business, which is dominated by nearly 15 million traditional mom-and-pop stores. Bharti tied up with Wal-Mart in late 2006 to open stores that would be owned by Bharti and run under a Wal-Mart franchise. India does not allow foreign investment in retail except for single-brand stores such as Nokia or Nike. Bharti said it would manage the front-end of the retail business, while Wal-Mart would be involved in the back-end, including logistics and supply and hire an estimated 60,000 new people.

But All is not Well - Civil unrest once again has shut down Bangalore's tech industry. IBM, Infosys, Wipro, and hundreds more outsourcing and technology companies didn't open Bangalore facilities Monday due to a labor strike over a court decision on water distribution from a nearby river. The protest stemmed from a long-running struggle over precious water between the state of Karnataka, of which Bangalore is the capital, and the state of Tamil Nadu. Businesses and schools were ordered closed and police patrolled the streets, according to reports published from India. Activists were arrested for trying to block trains, and set motorcycles and scooters on fire in the neighboring city of Mysore. Last month, many Bangalore businesses closed due to riots between Muslims and

Hindus. Outsourcers shifted time-critical work to backup centers in other cities and planned Saturday shifts to make up for lost time. Bangalore is often compared with the U.S.'s Silicon Valley. The recent spate of civil unrest and business closures, however, are a reminder that the region's tech industry isn't exempt from the turmoil and complex socioeconomic issues facing the rapidly developing country. Violence and safety concerns haven't stemmed just from protest. Last year, Indian authorities arrested a suspected member of a Kashmiri separatist group who was plotting attacks on major Bangalore outsourcing companies. The man reportedly carried an assault rifle, 300 rounds of ammunition, and a map marking the location of headquarters for outsourcing company Infosys Technologies, according to newspapers in India. Because of its prominence as a national source of revenue, India's outsourcing sector is becoming a favorite target of dissident terrorist groups, including those seeking Kashmir's secession from the country. In 2005, members of the Lashkar-e-Taiba terrorist group were found with plans targeting IT companies in Bangalore. Additional tech and outsourcing companies with facilities in Bangalore include Accenture, Amazon, AMD, Bearing Point, CapGemini, Cognizant, Dell, Google, Intel, Microsoft, Oracle, SAP, Sun, and Yahoo.

Samsung in Slovakia - Samsung is planning to build an LCD assembly plant in Slovakia, with the

initial investment being $155-million. The facility will be in the western Slovak town of Trnava and construction scheduled to begin during the next few months. Samsung already has plants in Slovakia making computer monitors and TV tubes. The LCD panel assembly facility, which could eventually represent an investment of $600-million, will commence operations next year, said Samsung. Samsung is believed to have won approval for its investment plan from the Slovak government, but it was unclear what kind of incentives it would receive. Together with sub-contractors, the factory is expected to create about 5,700 jobs by 2010. The investment will be one of the largest in Slovakia to date, but major Far Eastern consumer electronics groups have to date built assembly operations in Poland, Hungary and the Czech Republic. Archrival LG Philips LCD has an LCD assembly facility in Poland.