ODIS, Inc. - Business Overview

A coming major force in the $515 Billion Military (FY2009 Dept. of Defense Budget) and $300+ Billion by 2010 (reported by Business Wire Inc.) Commercial Semiconductor Industries is Optoelectronics which meets the market need for high volume, rapidly growing optoelectronics, wireless and sensor market segments which demand greater bandwidth, increase processing power and integration, with lower power dissipation while being cost effective. These markets are established, but are at a threshold where a new technology or technical dislocation is needed. Lower-priced implementations will permit these markets to achieve their potential volumes along with additional applications being addressed. Products for these emerging markets are not served by silicon components, owing to the physical limitations of silicon. Solutions currently are based on high-cost hybrid manufacturing technology using Silicon Germanium (SiGe), Gallium Arsenide (GaAs), or Indium Phosphide (InP) technologies: a new solution is needed.

ODIS Inc., with its R&D facilities located on the campus of the University of Connecticut, has developed and proven a new semiconductor process based on a new Group III-V materials system. This process, POET (Planar OptoElectronic Technology), is uniquely capable of producing monolithic IC solutions to meet the emerging needs of these emerging markets. POET allows ODIS to produce ICs with dense packing of active optical elements together with packing of high-performance electronic elements at a density similar to that of silicon. These monolithic implementations have a large advantage over today's hybrid-based solutions in density, reliability, and power dissipation, at a cost much lower than the best available competitors. ODIS will produce a market dislocation by providing monolithic IC components for these high volume high-performance markets with high-reliability, smaller, lower-power components at disruptively lower prices.

POET is differentiated from competing semiconductor processes, silicon, gallium arsenide, or indium phosphide by its more comprehensive set of elemental capabilities, and its ability to integrate them. POET can integrate lasers, modulators, photoreceivers, passive optics and high-speed, low-power electronics in monolithically-fabricated die: no other existing process can do so. This gives ODIS ICs their much lower cost structure, power savings and increased reliability.

Patent and trade secret protection on POET, plus ODIS's specific design knowledge using POET elements give ODIS a large, defensible barrier to competition.

Market Conditions & Drivers

Progress in the electronics industry over the past four decades has both driven and been driven by our ability to create and serve markets with faster, cheaper, and smaller monolithic integrated circuits. Each product advance in turn becomes the driver for the next wave of IC technology. Many new generations of IC technology from the earliest small-scale bipolar devices with 4 transistors through 0.09-micron feature size CMOS circuits with nearly 1-billion gate density have continually increased the ICs capabilities and thus those of the products in which they serve. Advances in PCs, communications, and many consumer devices have been powered by this continual development in semiconductor technology.

Today however, this paradigm is falling short. Particularly in the arenas of optoelectronics and very high-speed mixed-signal circuits silicon ICs will not serve, and no good monolithic (single-chip) technology exists. Today's implementations in these markets are not benefiting from the cost savings of integrated

technologies, but rather are based on hybrid or multi-component approaches. In the hybrid approach multiple individual semiconductor components of multiple technologies are interconnected to form circuits satisfying the needs of a particular application. This approach is used successfully to bring solutions to limited-size markets, particularly those in which performance is at a premium, but at a higher price. However, as the need for high-speed services spreads, and higher-volume markets emerge, this hybrid approach to implementation cannot produce competitive solutions. While hybrid technology will serve for limited-size markets, those able to tolerate higher price tags, it cannot serve truly large, competitive markets. A dislocation in technology is needed.

Today's semiconductor industry is typically seen as being dominated by silicon products, with the silicon IC industry then being divided into the PC/memory segment and the fabless IC segment. The fabless business segment is then split into a triad of separate industries providing: design tools, IC designs, and IC fabrication, all operating independently but synergistically. While this is a good description of the silicon portion of the semiconductor industry, it is not a model of the whole semiconductor industry. Left unaddressed is a multi-billion dollar cost-sensitive market for analog, mixed-signal, RF, and optical products that is currently served by a combination of non-silicon technologies: Si-Ge (silicon-germainum), GaAs (Gallium Arsenide), InP (Indium Phosphide), and GaN (Gallium Nitride).

ODIS Technology

ODIS's new and patented semiconductor fabrication process, POET is based on a unique Group III-V materials structure. The heart of POET is a unique and patented Group III-V materials system that supports monolithic fabrication of ICs containing active and passive optical elements, together with high-performance analog and digital elements. For the first time an economical integration of many optical devices together with dense, high-speed analog and high-speed, low-power digital elements are possible in monolithic ICs.

The processing of these wafers into products is done using a series of steps similar to those used in silicon processing, and is scalable to deep submicron feature sizes. POET device yield will thus be similar to that of silicon, much higher than that characteristic of many current III-V processes. This gives ODIS a technology basis that is uniquely powerful, that is economical to produce, and that is extensible in generations. POET is a uniquely-powerful mixed-signal process, integrating high-performance analog and digital electronics with high-performance active optical elements. ODIS ICs integrate a dense mix of active optical elements and optical waveguides together with logic and mixed-signal elements on a single chip, thus manufactured in one serial process. Capitalizing on POET capabilities, ODIS offers product solutions into the communications, optoelectronic, RF/wireless, sensor, and imaging markets.

POET allows ODIS to fundamentally alter the landscape for a broad range of applications by offering components with dramatically lowered cost together with increased speed, density, and reliability.

Addressable Target Markets

Military

POET's technology platform for optoelectronic integration exploits the optoelectronic and electronic behaviors of Gallium Arsenide (GaAs) semiconductor material. One of the benefits of this material, from a space electronics perspective, is that GaAs is significantly less susceptible to x-ray and gamma-ray total integrated dose (TID) radiation. GaAs is the long-standing choice for high-frequency (e.g. RF) devices and circuits, although, GaAs digital devices do not provide the performance that Metal Oxide Semiconductor Field Effect Transistor, (MOSFET) devices provide.

Important to military applications are the electronic devices that can be integrated into the POET architecture including both complementary heterostructure field effect transistors and complementary heterojunction bipolar transistors. These transistors enable both analog and digital functions in POET hybrid optoelectronic devices. Important to the military is ODIS's ability to integrate digital, RF, and optical technologies in a single device makes POET an important, high-performance capability that satisfies documented needs for multiple space systems and all Military Departments and Agency Tech Areas.

Commercial

Progress in the commercial electronics industry over the past four decades has both driven and been driven by our ability to create and serve markets with faster, cheaper, and smaller monolithic integrated circuits. Each product advance in turn becomes the driver for the next wave of IC technology. Many new generations of IC technology from the earliest small-scale bipolar devices with 4 transistors through 0.09-micron feature size CMOS circuits with nearly 1-billion gate density have continually increased the ICs capabilities and thus those of the products in which they serve. Advances in PCs, communications, and many consumer devices have been powered by this continual development in semiconductor technology.

Today however, this paradigm is falling short. Particularly in the arenas of optoelectronics and very high-speed mixed-signal circuits silicon ICs will not serve, and no good monolithic technology exists. A recent Electronic News Article stated that the optoelectronics market is forecast to surpass the discrete semiconductor market and become the second largest segment in the semiconductor industry behind integrated circuits, according to a report published by industry researcher IC Insights.