

ISRAEL HIGH-TECH REPORT

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From the Editor

Welcome Dr. Ne'eman!

In June a new Government of Israel assumed form and shape and the Knesset approved it. It includes 19 ministers and at least half as many deputy ministers. Public debate in Israel continues about the quality of ministerial appointments, and sometimes the appointments justify concern. However, the appointment of Dr. Yuval Ne'eman as Minister of Science and Technology could turn out to be one of those rare appointments - the most suitable man for the job. Dr. Ne'eman is a physicist whose name in recent years has been closely linked to Israel's Space Agency and its successful launches of the satellites Offek I and Offek II. Dr. Ne'eman has also shown a skill to think big. A few years ago he was a staunch backer of the Mediterranean -Dead Sea Canal idea. Under his aegis the project may be renewed.

The Ministry of Science and Technology, in recent years operates with a small budget limited to several millions of dollars. Yet, it has major responsibilities. It also has the potential for furthering Israel's ambition to enhance the scientific and technological standing of its people. These goals call for the promotion of basic research in areas of national priorities. It also calls for the bridging and synergizing of research to applications related to developing new technologies.

The current National Budget, says Director General of the Ministry, Arieh Shumer, does not include adequate funding for research and development. Yet, the total amount of money available for civilian and military research and development has been stated to be NIS 1.2 billion or \$600 million. A chain reaction can develop and as more money is used for basic research a greater demand and availability of money will surface for funding of industrial research and development. More industrial R&D contributes to an expansion of exports and the reduction of the trade deficit.

There are differences of opinion as to the amount to be spent on research. Some think that \$600 million is a goodly sum of money for a nation of just over 4 million people. In practice the various groups who

seek these moneys disagree. The heads of the institutes of higher learning in private, remind us that as a result of fund shortages capable scientists tend to relocate and to carry on their professional work in other countries.

Low salaries are a part of the problem. Equally important, are the moneys needed to pay for experimental equipment. Tight budgets for salaries and experimental equipment tend to limit the potential for attracting scientists who are needed in Israel but are working in other parts of the world.

The issues are many and pressing. Is biotechnology receiving enough research and development funding? Should desalination be assigned the role of a potential solution to Israel's looming water crisis? How can scientific and technological know-how further Israel's relations with Eastern European countries?

The recent wave of immigration creates its own challenges. New immigrants from Russia seek employment at the institutes of higher learning. A major effort to absorb qualified scientists and researchers without reducing the intake of Israelis is in progress.

The newly appointed Minister of Science and Technology, Dr. Ne'eman due to his experience in the world of science and technology understands the needs of Israel's scientific community. The scientific community in can be expected to have a forceful spokesman in Dr. Ne'eman.

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Xsirius Superconductivity Materials Ltd.

Joseph Vanzwaren head of the physics desk at the Ministry of Science and Technology drew our attention to Xsirius, Superconductivity Materials Ltd. IHTR met with the scientists and management of Xsirius, Israel's first commercial company active in High Temperature Superconductivity. The company is a majority owned subsidiary of the American Xsirius Superconductivity Inc. It is located in the Science Based Industries Campus in Jerusalem.

Who is betting on Xsirius?

American venture capitalists from the West Coast supplied about \$1 million in seed capital. These funds increased by the proceeds of a public financing issue have financed the cost of the services of Israel's leading scientists in HTS to oversee two years of R&D. It also paid for equipment whose purchase cost exceeds \$500,000.

Xsirius has attracted the attention of the Ministry of Industry and Trade and its Chief Scientist Yigal Erlich. He has extended to the company its first research and development grant.

What is its state of development??

After two years of intensive research and development Xsirius is now seeking to attract investors to provide second stage financing of \$3 million to pay for manufacturing lines, a marketing program and advanced R&D.

Xsirius focus on the market targets some of Israel's leading companies whose systems will function more efficiently and effectively with the use of the company's superconducting chips. The strategy is for joint development programs aimed at incorporating the Xsirius products into the existing systems or of its joint development partners.

What is Superconductivity?

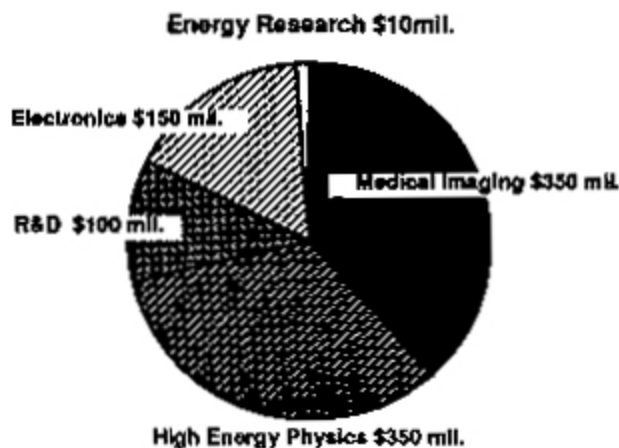
A physical state in which all-electrical resistance vanishes.

How Big is the Market?

An estimate of the current market place for superconducting materials is close to \$1 billion.

Xsirius is aiming at small segments of this vast market. This is intended to have cash flow while conducting longer term research.

The research is aimed at unraveling the know-how of producing flexible wires or tapes which will be superconductive at room temperatures.



What is Xsirius' strategy?

Xsirius is participating in the worldwide development of a new class of ceramic materials and the methods for processing them into useful shapes and forms. Xsirius is gearing to invest in machines and equipment needed for substrate and chemical production. Xsirius sees its opportunities over the near term in the sale of specialized chemicals which it has developed used in the deposition of HTS thin films. The two classes which Xsirius has developed have a critical temperature between 90K-110K. Xsirius has developed proprietary technology for the coating of magnesium oxide substrates with a unique "lattice matching" materials used in HTS thin film application.

Xsirius has two development projects one of which aims at creating a unique method to form a flexible HTS electrical conductor and the second for processing HTS materials to increase the electrical current conductivity. Either one of these projects when finished successfully could represent major marketable products.

The long term strategy is for the company to become self supporting through contracts and eventually, product sales. Over the near term Xsirius is depending on creating joint venture partnership programs. To establish its first products and create enough business opportunities to warrant the planned expansion manufacturing/production lines. with Dead Sea Periclase, Xsirius is seeking to enter the worldwide inagnesium oxide substrate market.

The company's business progress hinges on the time frame it will take to enter its first targeted markets and its skill to raise capital. The next financing

stage calls for \$3.0 million.

Personnel

Xsirius has two administrators and 9 scientists mostly holders of doctorates. It recently hired a Russian immigrant scientist and Xsirius is taking advantage of Israel's Ministry of Absorption's willingness to offset the payroll costs to companies which hire them.

Facilities

Xsirius occupies a 5800 sq. ft. facility and from there is supplying magnesium oxide crystals. It also is producing thin film HTS ceramic materials by spray pyrolysis, a process allowing mass production of HTS films on very large substrates and Organo Metallic Chemical Vapor Deposition. Earlier this year began producing HTS materials by laser ablation.

The technology for the fusion of high purity magnesium oxide is owned by Dead Sea Periclase Ltd. The company manufactures about 62,000 tons year of magnesium oxide sold for refractory bricks for steel furnaces. At 3000 C. magnesium oxide melts and fuses. High purity fused magnesium oxide is mostly for the nuclear industry. Large crystals of pure magnesium oxide result by an adjustment the manufacturing process. The crystals produced lend themselves to cutting and polishing and the cutting and polishing into pure magnesium oxide substrates. Substrates are thin slices of polished or cleaved single crystals used as a base for thin films of the new high temperature superconductors. The new superconducting materials developed in 1987 including yttrium-barium-copper oxide and other melted oxides lose their electrical resistance at liquid nitrogen 78 K. instead of liquid helium temperature 4K. Have found application as passive microwave devices. This application calls for a deposition of very thin film layer of crystallographically well oriented films on nearly perfect and chemically pure single crystal substrates. A successful crystal used today in the scientific community is Magnesium Oxide.

Superconductivity Economics

Dead Sea Periclase's interest is mostly research and development, according to Dr. Roland Mureinik, specialty products manager at Dead Sea Periclase.. The sintered magnesium oxide for refractories is priced at \$0.60 kilo. Pure magnesium oxide crystals are priced at \$50 per kilo. The small substrates weigh only a few grams sell for \$50 each and the largest substrates sell for several hundred dollars each.

Near-Term Moves are Market Oriented

Xsirius is moving along the path of conducting leading edge research and development and product development. It is aggressively marketing its intermediate layered substrates for use in systems related to microwave and radar.

A.E.L. Laboratories in Bid For Tadiran

C.E.O. Dr Leon Riebman, on his most recent visit to Israel in the second week of June, expressed an interest in increasing the 6% holding in Tadiran to a controlling interest. After Dr. Riebman completed his trip Tadiran announced that it lost \$145 million in 1989. Koor, owner of Tadiran, has not come up with a valuation which could serve as a basis for negotiations. It is unlikely that the Histadrut, Israel Federation of Labour, which controls Koor Industries by means of its holding company Hevrat Ovdim would agree to sell more than a 20% stake to a foreign company. Histadrut Labor Federation Secretary Israel Kessar was one of many individuals contacted by the American executive.

NEW PRODUCT

Iris' Anti-Virus is A Winner

The Virus Bulletin, an authoritative publication, expects that by 1992 computer viruses will affect 8 million personal computers globally and that virus infections will reach epidemic proportions by 1995. Iris Software Computers has established an enviable record in supplying off-the-shelf personal computer software vaccines.

In November 1987, thousands of personal computers in Israel were attacked by a computer virus. Iris has developed several products trademarked "Anti-virus" which

- (1) detects the virus in computer files;
- (2) destroys most of the known viruses and restores the infected files;
- (3) immunizes the computer against future infections by other viruses.

Iris is the originator of the world's first micro-computer data base and application generator. Users in Israel and elsewhere, find the products highly effective leading to the company's very rapid growth.

Iris was founded in 1979 and specializes in developing software for mini- and micro-computer systems.

Israeli Companies on Wall Street

Selected income and earnings summaries for the 3 months ended March 30, 1990, unless otherwise indicated. Nearly all of these companies are intensively export oriented. Prices are as of June 19, 1990 and the price changes relate to those a month ago.

<u>Company</u>	<u>Revs</u> (in\$ mil.)	<u>Net Income</u> (in \$thou.)	<u>Price</u>	<u>Net</u> <u>Change</u>
ELBIT COMPUTERS Defense electronics	84,972	5,068	12,375	+0.875
ELBTF OTC				
ECI TELECOM Telecommunications	17,253	3,591	25,750	+3.625
ECILF OTC				
ELSCINT Medical imaging	35,583	2,339	3,250	-.025
ELT NYSE				
FIBRONICS Fiberoptics	14,677	848	11,125	+3.000
FBRX OTC				
INTERPHARM LAB. Biological products	4,700	(400)	5,000	+1.250
IPLLF OTC				
LASER INDUSTRIES Surgical lasers	7,528	(1,018)	6,125	+0.375
LAS ASE				
OPTROTECH Electro-optical systems	20,239	867	7,000	-0.500
OPTKF OTC				
SCITEX LTD. Computer graphics	70,005	14,149	35,500	-2.000
SCIXF OTC				
IIS INTELL. Computer peripherals	N.A.	N.A.	7,750	+3.000
IISLF OTC				
TEVA PHARMACEUT. Pharmaceuticals	70,476	4,925	11,125	+0.375
TEVYF OTC				
ELRON ELECTRON. ELRNF OTC	85,702	1,207	6,875	-0.125

WHY IS ELRON LAGGING?

The stock market valuations of many Israeli companies whose shares are traded on the New York Stock Exchange, American Stock Exchange and NASDAQ have appreciated sharply and sometimes dramatically in 1990. Technology issues have advanced well above the average and this appears in recent issues. Value oriented investors will have a hard time in making commitments to shares of companies whose prices have advanced by tens of percentage points. The fact that Scitex and ECI Telecom market valuations may not be exceedingly high based on their earnings potential will keep away all those except highly aggressive investors.

But, there are other possibilities and one of these on the face of conventional wisdom is Elron Electronic Industries. Analysis of the price behavior of investment holding companies and their shares often shows that market valuations of such shares tend to be in the order of 15% under their net asset value. To determine the net asset the valuation of the public holdings of Elron Electronic Industries we used the company's own valuations. On June 3, 1990 the stock market valuation of Elron's holdings in publicly traded shares was \$145 million. (see pie chart for the exact distribution of the Elron holdings) The net asset value of these holdings per Elron share

management's statements that falling profits were resulted from "stiff competition" and higher R&D expenses Arbitrage activity is not a factor in keeping the Elron shares in a narrow price range.

Elron has reduced its debt greatly and has ended a rights issue. These two factors are positives and may serve to restore investor appeal.

Scitex Announces Cash Payout

In the first quarter of 1989 Scitex earned \$14.1 million or \$0.78 cents per share. If the company will pay out a total of \$0.50 for 1990, the yield based on current prices will be less than 1.5%.

The announcement is notable as it is the first time in the history of the company that it is paying its shareholders a dividend.

InterPharm Laboratories Ltd.

Sale of the company's human growth hormone are on the increase but interferon sales are down. Sales in the first quarter of 1990 advanced to \$4.7 million, a good jump from last year's \$3.6 million. InterPharm reported a \$400,000 loss as compared with a \$100,000 profit a year ago. Shareholders are unhappy about the company's offer to buy out minority holders at under \$3. Shareholder litigation could become a problem.

Aryt Optronics Reports Reorganization Finished

After selling off its foreign operations Aryt has concentrated its production of optical elements and lens coating and research and development activities at its Jerusalem based subsidiary Aryt-Ophir Optronics. The moves have resulted in Aryt's posting a small profit, of under \$ 100,000 on first quarter sales of \$ 2.16 million. Aryt is a small company but

ELRON ELECTRONICS



is \$9.08 without attributing any value to Elron's non-publicly owned holdings. The market price of Elron shares; however, was under \$8, representing a discount of 16% to its net asset value. By contrast, to other technology issues Elron does not attract the same popularity enjoyed by the others. This is not easily explained. Elbit is valued at close to its historic highs and Fibronics has recently seen a runup. Only Optrotech has stumbled in reaction to its

Israel High-Tech Report Index*

136.5 - 1.2%

*ISRAEL HIGH-TECH REPORT INDEX is a weighted index made up of the shares of leading high-tech companies.
BASE=100 AS OF SEP.30,1984

it is liquid and management will undoubtedly be looking for investing a part of the \$ 7 million which is sitting in the bank.

Institutes of Higher Learning Report

Weizmann reports about progress in research which has led to the development of a method of fusing cells from an alien species into a target line allowing the conversion of male fertile lines into male sterile ones. The application of this research is being targeted at the production of hybrid seeds to grow

Virus free potatoes. Can it work? Probably yes. Prof. Esra Galun has seen his approach being successfully used to produce hybrid tobacco in Japan. He is now collaborating with the International Potato Center in Peru which hopes to apply the findings of Prof. Galun to actual potato breeding projects in several developing countries.

More on Supraconductivity

Prof. Shimon Reich's work in superconductive materials has earned for the researcher the Professorial Chair of Industrial Chemistry at the Weizmann Institute. He succeeds the retired Prof. David Vofsi. Ceramics are problematic materials when it comes their being machined or shaped. Unfortunately, they are brittle! Prof. Reich in trying to overcome the drawbacks of the inherent qualities of ceramics has devised a new method to produce ceramic superconducting composites by pre-coating micron sized ceramic particles with thin layers of various metals such as silver. When fused a honeycomb metal structure results with grains of metal ceramic materials. The researcher noted that the less metal in the composite the more desirable are the electrical and metallic properties. Even more satisfying is that the substance can be machined and rolled and electrical leads can be soldered to the surface. The composite produced is a model for research on new high transition temperature superconductors.

Making Room for Russians

The influx of Russian immigrants has strained the facilities of the institutes of higher learning. Coping with the pressure for extra openings is being handled in the Weizmann Institute by increasing the size of the student body at Weizmann Institute. This is to create opportunities for newcomers without reducing openings available for Israelis and students from other countries. Feinberg Graduate School Dean Prof. Benjamin Geiger announced that 50-60 new doctoral students will be accepted, raising the total

number of doctoral students by 10-15 per cent. Ten new scholarships have been already prepared. Currently 450 doctoral and 180 master's students are studying at Feinberg.

A Word About Mummies

The Middle East continues to be a muddled area as far as international politics are concerned. However, molecular analysis carried out by Israeli, German and French scientists shows that the explanation for the excellent preservation of Egyptian mummies dating from the 4th century B.C. to the 4th century A.D. used asphalt collected from the Dead Sea. Ancient historians and modern archaeologists earlier had disagreed on this point.

Testing for Malaria and Related Parasites

It is bad enough that 300 to 400 million people worldwide contract malaria each year. Even worse than that, several millions of them die, mostly children and pregnant women. Pharmaceutical companies have developed effective synthetic anti-malarial drugs but in third world nations, where there are poor public health facilities, it is nearly impossible to establish that patients take their medication regularly. Researchers have found that resistant parasites have developed over the years. The most commonly used test for malaria is a microscopic examination of a drop of blood. The test is simple but gives a 60% rate of false positives, meaning that medication is often prescribed when unnecessary. To Ben Gurion researcher, Dr. Yaacov Pollak clearly set out to develop a method to test the patient for malaria and for the malarial parasite's drug resistance. Working with Dr. Michael Alpers, of the Papua-New Guinea Institute of Research, they devised a technique which uses specific DNA probes which detect parasite DNA in infected people. Technicians use the probes with accurate results on hundreds of thousands of samples in even the most simply equipped health clinics in remote areas. Following up on his initial research, Dr Pollak is working on a DNA probe which can test both whether the patient is suffering from malaria and whether the parasite is resistant to specific drugs. Pharmaceutical companies may consider producing ready-to-use kits, priced; so that, even poor nations would be able to afford them.

Yeast Increases Freshness for Out of Season Fruit Exports

Agricultural Research Organization researchers have isolated a form of yeast which protects fruits

have isolated a form of yeast which protects fruits and vegetables from losing their freshness. A type of yeast which protects citrus fruits from fungicidal attacks is commercially available. Shipments of tomatoes and cucumbers which were shipped last winter to Europe used the coating. The yeast which ARO produces in commercial quantities offers commercial potential to Israeli growers also to farmers in various parts of the world.

Computer Language

Israel is a leading country with regard to the use of logic programming in education. Prolog is a component in the official computer science curriculum for Israeli high schools. Logic programming, one of the approaches suggested for the computer language of the future was also the main topic of a conference the 7th International Conference on Logic Programming. Logic programming is useful for rapid prototyping that is quick writing of trial programs and for devising data bases that not only store data but also deduce information from mathematical rules and formulas.

Israel is a Market for Large Systems

Hitachi Limited of Japan has announced that it has developed the world's fastest mainframe computer. This marks the first when Hitachi Ltd. has been ahead of I.B.M. and other manufacturers in their release of a new generation of computers.

The claimed advantages include a 20% lower power utilisation, and a 50% reduction in size as compared with I.B.M. units. Israel is an important market for I.B.M. compatible mainframes.

Competition for market shares is intense. While I.B.M. is the dominant factor in the field, Hitachi Data Systems has announced that shortly it will be marketing in Israel, its most powerful, general purpose mainframe system.

ELBIT HEADS UP DISPLAY SYSTEM

Elbit's heads-up display system may shortly enter the American market as part of a larger system being supplied by an American company to the American military establishment.

Efrat Lands BundesPost Contract

Efrat Future Technology will be supplying the German Bundespost with its Trilogue. The value of the contract is in the order of \$ 5 million. Efrat specializes in business and defense products based on

voice and image messaging, audiotex, F.A.X. mail. The technology is known as High Throughput Store and Forward Technology. Efrat employs 70 of whom 60 are research and development specialists. Recently one of the large Swiss firms, Ascom, invested more than \$6 million to acquire a strategic technology investment in Efrat Future Technology.

From Israel to India

Kibbutz Ein Harod has reported selling Awassi ewes to India. The Awassi's sheep have an average milk yield of more than 300 liters a day as compared with ewes in India whose milk production is at a level of 50 liters per day.

Aaron Lewis Innovates and Tapers Optical Fibers

In the IHTR April of this year issue we featured Prof. Aaron Lewis' innovations in lensless microscopy which allowed the seeing of single cells. Prof. Lewis is innovating by tapering optical fibers to concentrate a beam which travels through the fiber. The exiting beams are not equal to the intensity at which they enter. The use of optical lenses has increased the intensity. Prof. Lewis' innovation has

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technique of tapering the optical fibers. The tapering concentrates the beam to a fraction of its initial diameter and results in increasing the intensity. It is also possible that by this technique the exiting beam will be even more intense than at the point of entry.

Orbot Systems Ltd. Delays its IPO

The company's first U.S. public offering aimed at raising more than \$40 million has been postponed. The U.S. underwriting firms of Shearson, Lehman and Hutton and Alex Brown differed with company management on the offering price. Postponements of financing issues are costly and as the market conditions in the United States were good, eyebrows were raised in Israel when the issue was postponed for 60 days or longer.

Detachable Motor Available for Paraplegics

Paraplegics who have been wheel-chair bound and have been limited in their mobility can turn to Kibbutz Tzora near Jerusalem to improve the quality of their existence. The Kibbutz Tzora innovators claim that their Samson Power Drive consists of an easily detachable motor-driven unit that allows the disabled to wheel themselves around manually. The motor is battery operated and can travel more than four miles in-between charges.

Dead Sea Periclase Ltd. From Brine to Pure Bricks

IHTR visited Dead Sea Periclase. The company is located near Arad and specializes in the conversion of magnesium chloride brine to magnesium oxide. It produces raw material which is used as a refractory lining in steel-making furnaces.

The production begins at the lowest point on earth, the Dead Sea. The most abundant of the vast mineral resources found in the Dead Sea is magnesium chloride. From the magnesium oxide brine, DSP manufactures "dead burn" magnesium oxide known as Periclase with purity levels exceeding 99%.

A production facility adjoining to DSP uses the hydrochloric acid which is a by-product of DSP's production.

DSP was established in 1970. Brine pumped from the Dead Sea is stored in ponds. From there the brine is pumped into special reactors invented by Israeli scientist, Prof. Joseph Aman. Ironically the inventor was refused a patent in Israel. He did obtain a patent in England and subsequently DSP purchased the rights from English company..

The magnesium chloride is converted into crude magnesium oxide. The sprayed brine is decomposed into magnesium and hydrochloric acid. The production process is continuously surveyed in the control room. The crude magnesium oxide is released into hydration tanks. From the tanks it is passed through a washing and filtering process and the material is upgraded into a 99% purity and sometimes even higher. The magnesium oxide is calcined and sintered and special techniques are employed to produce a bulk specific gravity of up to 3.45 gr/cu. cm. At this stage the magnesium oxide is ready to be bricked.

Fusion into magnesium crystals at 2000.

Dead Sea Periclase's research and development efforts are aimed at finding new applications for its basic magnesium oxide. As part of this effort it developed nuclear-grade fused magnesium oxide suitable for the manufacture of ceramic labware and substrates for semi-conductors (see report on Xsirius p.2).

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