

Technology opportunities from Asian countries

Bangladesh

Aquaculture

- Breeding and hatchery management of carps;
- Collection and preservation techniques of pituitary glands for induced breeding;
- Polyculture of carps;
- Pond culture of riverine catfish (*pangasius*);
- Culture of GIFT strain *Nile tilapia* in seasonal ponds;
- Culture of Silver barb (*Barbodes gonionotus*) in seasonal ponds;
- Production techniques of improved catfish hybrid;
- Artificial propagation and culture techniques of riverine catfish (*pangasius*);
- Integrated fish duck farming;
- Artificial propagation and culture of *Ompok pabda*;
- Artificial propagation and culture of *Mystus vittatus*;
- Development of low-cost fish feed from indigenous ingredients;
- Prawn seed production in backyard hatchery;
- Poly and monoculture of freshwater prawn;
- Improved culture technology of *Penaeus monodon* in gher;
- Control of fish disease;
- Hilsa fisheries management and development;
- Culture of genetically improved Silver barb strain; and
- Improved technique for prawn nursery management

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China

Energy and environmental technologies

- Solar hot water systems and solar water heater units;
- Advanced solar absorber for flat collector;
- Two-stage LiBr/H₂O absorption chiller;
- Solar power system and products;
- Low temperature geothermal energy utilized on hot air drying;
- BD-type wave-activated generation device series, used for navigation buoy;

- Irregular wavemaker system;
- Onshore wave power device;
- Biomass circulating fluidization bed gasifier (CFBG);
- Medium-scale power station of biomass gasification and generation;
- Energy self-supported municipal solid waste (MSW) composting system;
- Solid waste pyrolysis-combustion combined incinerator;
- High reliable steel-water heat pipe for industry;
- Pulverized coal low flyash combustion technology and its application;
- Intelligent heat pump dryers;
- The new type continuous blowdown flash tanks for boilers;
- The new type periodic blowdown flash tanks for boilers;
- The photocatalytic household drinker;
- Photocatalytic treatment of drinking water in city;
- Photocatalytic purification of indoor air;
- The compound AFH coagulant;
- Anaerobic-aerobic-biocarbon (AOC) system of industry organic wastewater;
- Treatment technology;
- YSJ water-treatment system for swimming pools;
- The information and navigation system of city's traffic;
- The timber drying kiln equipment; and
- Computer time controller.

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Microelectronics

- Silicon condenser microphone and ferroelectrics materials film microphone;
- RF-MEMS devices: MEMS switch, PZT film filter, SAW RF filter, MEMS planar spiral inductor, and RF MEMS antenna;
- Novel integrated sensors: pressure sensing operational amplifier, silicon micro accelerometer, and room temperature infrared rays microbolometer; and
- Contactless IC card chips.

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Nanotechnology

- A method and special device of preparing for carbon nanotubes with oriented arrangement; and
- A method of synthesizing GaN nano-materials.

For more information, contact:

*The Institute of Physics, Chinese Academy of Sciences
P.O. Box 603, Beijing 100080, China
Tel: (+86-10) 8264 9361; Fax: (+86-10) 8264 9531*

- Patents on laser nanopowder;
- Practical novel patent-nanoparticles preparing by laser; and
- A method of preparing for microcrystal coating of a kind of alloys.

For more information, contact:

*Institute of Metal Research
Chinese Academy of Sciences 72 Wenhua Road
Shenyang China, Postcode: 110016
Tel: (+86-024) 2397 1756; Fax: (+86-024) 2389 1320
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- A method of preparing for rare earth oxide superfine powder by carbonate precipitation

For more information, contact:

*Changchun Institute of Applied Chemistry
Chinese Academy of Sciences
Tel: (+86-0431) 5687 300; Fax: (+86-0431) 5685 653*

- Preparation of carbon nanotubes with evenly-distributed diameter by the method of transition from CO to CO₂ and then CO;
- A method of preparing for carbon nanotubes in batch;
- A method of preparing for carbon nanotubes in succession; and
- A kind of catalysts preparing for carbon nanotubes.

For more information, contact:

*Chengdu Institute of Organic Chemistry
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- A method of the fabrication of nanoscale Fe-C alloy and its applications

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Engineering methods/processes

- Cryogenic wind tunnel with a thermal separator;
- Gas-pulse ash cleaning technology;
- Full scale in-site structure strength monitoring technology;
- YAG laser texture technology and industrial applications;
- Fine aluminium powder production system and related application research; and
- Technology of test, integration and demonstration for the tele-science.

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India

Electronic materials

- Ion beam microetching/milling equipment;
- Manufacture of luminescent materials (phosphors);
- Development of beta alumina tubes for sodium metal production – prototype;
- Development of sensors and particulate filters for diesel engine exhaust;
- Process for the preparation of polycrystalline silicon ingots;
- Design and fabrication of pecvd and rie reactors;
- Glucose biosensor;
- Sensors for detection of toxic gases and microbiological organism - prototype
- Gun sight reflector for Mig-21 aircraft;
- Anti-glare coating on spectacle lenses for night driving applications – prototype;
- Front surface reflector coating for rear view mirror in automobiles – prototype;
- Accelerometers; and
- Fog coatings.

Engineering materials

- Iliarov carbon composite rings for orthopaedic application – prototype;
- High-density isotropic graphite (Hd-Ig); and
- Cold/warm forging of automobile components.

Materials characterization

- A process patent entitled “an improved process for making semiconductor shallow junctions useful for the manufacture of microelectronic devices and the semiconductor shallow junctions made thereby”;
- Good quality lithium niobate single crystals for saw devices and non-linear optical applications;
- Water repellent chemical for cellulose base material; and
- Synthetic paint remover.

Electrical and electronic standards

- Teleclock - prototype.

Radio and atmospheric sciences

- Doppler sodar.

Superconductivity and cryogenics

- Superconducting magnet technology;
- Cryo-pencil units for surgery; and
- Two pressure relative humidity generator.

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Salt-inducible expression vector for genetically engineered proteins

A plasmid vector system has been constructed that could over produce any desired protein, inducing high salt in the medium and uses *E.coli* as the host. By this method the desired protein can be made in high purity at a cheaper rate.

RNAs in-inhibitor of ribonuclease

A procedure has been developed for the preparation of superior quality of RNAase inhibitor which has commercial value. This protein is used in many molecular biology procedures to suppress RNAase activity. RNAsin also inhibits tumor angiogenic activity and may have medical potential.

Polymerase chain reaction (PCR) based markers for rice

Microsatellite markers that distinguish rice lines have been identified, and conditions for using these markers are standardized. This assay has several advantages over the conventional grow-out test for determining hybrid seed purity.

Host defence antimicrobial peptides as therapeutic agents

During the course of investigations, a large library of peptides have been generated having broad spectrum antibacterial activity with negligible cytolytic activity. These peptides are amenable to convenient synthesis and have potential as therapeutic agents.

A novel *in vivo* assay system for screening and validation of anti-cancer drugs

The technique exploits the role of oncogenes and tumor-suppressor genes during normal growth and development.

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Japan

Synthesis of nanoporous crystalline metal oxide materials

The crystalline metal oxide (MO) composite porous materials are composite nanoporous materials with a framework of crystalline MO with tailored 3-dimensional structures having regularly arranged nanopores and forming a porous framework. The newly developed material is expected to be applicable to catalyst carrier, adsorbent, photocatalyst, dye-sensitized solar cell, sensor, energy storage device, and so on through the utilization of its electronic and chemical properties as well as molecular sieve features of nanopores.

Organic/inorganic molecular-hybrid polymer electrolytes for intermediate temperature operation

High temperature proton conducting polymer electrolytes have been synthesized through the sol-gel processing of organic/inorganic molecular hybrids. The membrane doped with inorganic acidic clusters shows large proton conductivities up to 160°C under humidified conditions. Proton conductivities of larger than 10^{-2} S/cm at elevated temperatures have been achieved, and the conductivity can be correlated with the nanophase separation to form bicontinuous inorganic channels in the flexible polymer matrix.

Thin-film silicon solar cells using an adhesive bonding technique

A 10-mm-thick single-crystalline solar cell was fabricated by adhesive bonding of an alumina ceramic substrate, and the cell performance was estimated. The open circuit voltage, short circuit current and cell efficiency were 602 mV, 25.8 mA/cm² and 9.6 per cent, respectively. Although the silicon layer of the cell is very thin, high open circuit voltage is obtained. The results indicate that the adhesive bonding technique is suitable for realizing high-efficiency thin-film cells.

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Synthesis of apatite fluoride-coated titanium dioxide photocatalyst

The composite catalyst is characterized by dual actions: adsorption of odorous and/or noxious substance by apatite with or without light, and decomposition of adsorbed matter under illumination. Besides, apatite coating protects photocatalyst mixed in resin or paper, ensuring broader area of application.

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Preparation of 10 μ m-thick-PZT films for piezoelectric film devices

A combination of the preparation techniques for the ferroelectric films and the micro machining of Si is considered to be an effective way to fabricate microelectromechanical systems (MEMS), such as piezoelectric micro-transducer devices for applications in the electrical and medical fields. In this study, disk shape lead zirconate titanate (PZT) thick films were successfully fabricated. More than 10- μ m-thick PZT films were deposited onto Pt/Ti/SiO₂/Si substrate using a chemical solution deposition (CSD) process. Pt top electrode and PZT layer were etched by reactive ion etching (RIE) process, and 20 to 500- μ m-diameter PZT micro disks were fabricated.

For more information, contact:

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Synthesis of a (Zn,Cr)Te room-temperature ferromagnetic semiconductor

The (Zn,Cr)Te ferromagnetic semiconductor functions at the highest temperatures seen to date. Thus far, scientists have only been able to produce ferromagnetic properties at temperatures below -100°C, but this research has significantly increased this temperature to +27°C (300K). The semiconductor-like electrical and optical properties of the material are vital for use in technology applications. (Zn,Cr)Te is a promising material for new semiconductor devices with magnetic memory functionality (spintronics device).

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Hydrothermal conversion process of biomass

Fractionation process of plant biomass using water alone was proposed as an environmentally friendly conversion process for a maximum utilization of biomass. If water is heated in a closed vessel, the ion product of water increases with increasing temperature and pressure, and the hot compressed liquid water in the vessel comes to have a hydrolysis-ability. Hemicellulose in plant is hydrolyzed to oligomers at temperatures 140-220°C, being functional food which keeps the intestines in a healthy state. Then, cellulose is hydrolyzed to glucose and its oligomers above 230°C. These products from cellulose can be converted to ethanol or poly-lactic acid that are used as a clean energy and bio-degradable polymer, respectively.

Hard-film coating technology using carbon dioxide, methane, and metal

An environmentally friendly hard-film coating technology synthesizes hard metal oxycarbides using a reactive sputtering method, with metal, carbon dioxide, and methane as the raw materials. During the metal oxycarbide synthesis, a small amount of rare gas was mixed in to promote carbon dioxide ionization and produce a tungsten oxycarbide coating. The

chrome oxycarbide is extremely corrosion- and abrasion-resistant, while the molybdenum and tungsten oxycarbide are hard and abrasion resistant. In particular, the tungsten oxycarbide is the hardest of these materials. We expect these materials to be used as hard coating materials.

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Organic-inorganic hybrid materials for VOC gas sensors

Intercalative type organic-inorganic hybrid materials have been proposed as the chemical sensors for detection of volatile organic compounds (VOCs). The organic and inorganic components take part in molecular recognition and transduction of chemical signals to measurable resistance changes, respectively. We tested this idea with polypyrrole intercalated MoO₃ hybrid materials, (PPy)_xMoO₃, with a layered structure. The (PPy)_xMoO₃ pressed pellets show a distinct response to VOCs by increasing in their electrical resistivity. (PPy)_xMoO₃ exhibits higher sensitivities to polar analytes such as formaldehyde and acetaldehyde, whereas it showed almost no response to toluene and benzene.

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Common software platform on parallel computations for discretized numerical schemes

The parallel software general platform has been developed for various numerical schemes such as finite element method, finite difference method, and finite volume method as well as other numerical schemes, to assist a smooth shift to parallel computational world for non-specialists in parallel computations, which only requires ordinary input data and the subroutine to construct his stiffness matrix.

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Kazakhstan

Environmentally sound technologies

- Wastewater treatment in textile dyeing industries;
- Small-scale "EDIS" water desalination and purification electro dialysis unit;

- Medium-scale "EDIS-D" water desalination, purification and disinfection unit;
- Large-scale electro dialysis unit "EDIS" for industrial water desalination and treatment; and
- Sea water desalination by electro dialysis technology.

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LAO P.D.R.

Energy

- Fuel efficient cooking stove;
- Solar tunnel dryers; and
- Micro-hydro power.

Food processing/agro industry

- Sun dried products: fruits (bananas, pineapples, berries), fish;
- Mulberry green tea;
- Brown rice;
- Fermented fish;
- Fruit drinks/wine;
- Bamboo basketry;
- Wild silk;
- Organic farming using bio-extracts – fruits, vegetables, and fish; and
- Organic fertilizers in solid and liquid form.

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Nepal

Improved cook stove (ICS)

Improved Cook Stove (ICS) is a modified version of the traditional cooking stove. Certain features have been modified to make them more efficient with respect to fuelwood consumption, make them convenient for cooking and much safer from a health point of view. The stoves are made from locally available materials such as clay, agri-residue, stone/brick and so on. For the installation of the cook stove, a mould for both the stove and the chimney are used which maintain the standard dimensions.

Improved water mill

The improved water mill is a modified version of a traditional water mill. The traditional water mill uses a wooden runner with straight blades to convert the kinetic energy of falling water (hydro power) into mechanical power, especially for grinding

grains. By replacing the wooden runner by a metal runner with a technically better design and improving some other parts of the traditional mill, the operational efficiency can be increased (resulting in quicker processing of grains) and the addition of applications are made possible, for example hulling, oil expelling, water pumping and electricity generation.

Solar cookers

Technical support services is provided to interested individuals, government organizations as well as CBOs, INGOs and NGOs for the promotion and dissemination of Solar Cookers. At present, mainly two types of solar cookers, Solar Box Cooker and Parabolic Solar Cooker are ready for large scale promotion.

Solar dryers

Necessary technical support services are provided to interested individuals, government organizations as well as INGOs and NGOs for the promotion and dissemination of Solar Dryers in both urban/rural areas of Nepal. In order to respond the demand from the users, CRT has been making collaborative efforts for fabrication and distribution of Solar Dryers.

Small scale briquetting

Briquettes are compacted pieces of organic waste (such as agricultural and forestry waste) that have a high energy value and are used for energy generation through combustion. The briquettes can be used for domestic purposes (cooking, heating, barbecuing) and industrial purposes (agro-industries, food processing) in both rural and urban areas. This technology is promoted and disseminated on a larger scale.

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Sri Lanka

DSP based sinewave inverter

- System is flexible, allowing individual pulse timing to be controlled via DSP loop;
- Harmonic content and true RMS value calculation is possible for control or monitoring purposes;
- Output waveform shape can be changed to any if necessary;
- Low component count in overall design; and
- Power line monitoring also can be coupled with the DSP subsystem for advanced designs.

150VA square wave inverter with 1.5 hours backup

Specifications include:

- Supply voltage: 12V DC
- Output waveform: Square wave
- Output voltage: 230V AC
- Frequency: 50Hz

Advantages of square wave inverter:

- Works from a 12V battery;
- Low component count inverter;
- Offers closed loop voltage regulation;
- The output can be varied by changing the battery voltage & power MOSFETS;
- Automatic cut off when the battery voltage is low; and
- Automatic cut off when the inverter is over loaded.

FM/AM transmitter based remote control systems

Key features:

- Use of short range transmitter modules;
- Unique channel (digital) controlling upto 4096;
- Maximum distance is 5 kms;
- Modular construction of transmitter/encoder and receiver/decoder; and
- Use of authorized frequency ranges 413MHz, 433MHz and 868 MHz.

Applications:

- Remote access controlling;
- Remote equipment controlling;
- Vehicle security systems; and
- Data communications.

RFID based access control system

The system units include:

- Interrogator (reader);
- RFID tags;
- Real time clock;
- Data logging memory (nvram);
- Access giving sub system;
- PIR sub system (optional); and
- Alarm sub system (optional).

The applications include:

- To identify any access;
- To give permission for authorized people to access and to record the time; and
- To alarm on unauthorised accesses.

Customizable display systems

The main units of the system are:

- Central controlling unit;
- Token dispenser unit;
- Display panel; and
- Customer service agent points.

The applications include:

- To route the customers to vacant counters without unnecessary delays; and
- To effectively use the available customer service agent points.

Digital PBX system

The system is functionally divided into the following sub-systems:

- Analogue termination sub system;
- Control sub system;
- Switching sub system;
- Time slot assignment sub system;
- Signalling sub system;
- Power sub system; and
- System control software sub system.

The analogue termination performs the well-known 'BOR-SCHT' functions. A Subscriber Loop Interface Circuit (SLIC) and a Coder/DECoder (CODEC) is used to implement these functions. The selected SLIC and the CODEC from MITEL Components are MH88610 and MT8960. The terminal card was designed to accommodate eight extensions or seven extensions + one PSTN interface. The hook information of 8 ports could be accessed via the data bus through a tri-state buffer, which is mapped to the system address space.

PSTN interface's ring detect signal was wired as the hook status signal. Protection was implemented through transducers gas discharge tubes (GDT), metal oxide varistors (MOV) and fuses. We used two digital switches to interface CODECs via the ST Bus and the standard microport of the switches to communicate with the micro-controller.

Control sub system is composed of a micro-controller, memory, memory/line scan interface, and switch/CODEC interface, host PC interface and system control software. The micro-controller cannot directly communicate with the CODEC and needs an interface in-between. We used two digital switches to interface CODECs via the ST Bus and the standard micro port of the switches to communicate with the micro-controller.

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Investment opportunity

The ConceptNursery will seek strategic partnerships with other regional technology incubators, associations, investment funds and Corporations to provide resident companies build technical and management teams, access to international networking/international markets and the support of both domestic and international venture capital funds to grow their businesses. This support and services will advance these projects from a technological idea to its materialization as a company in its own right.

If interested in becoming a strategic partner/investor, contact:

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Thailand

Electronics

- IC photography process by direct write laser pattern generator;
- Divice replica production process in IC;
- Ion implanter;
- Thin-film growing machine with chemical vapour in low-pressure condition; and
- Micro-controller speed MEL805X development.

Telecommunication technology

- Model for radio cell station of wireless local loop;
- UPS for economical and high-efficiency PC;
- Data processing chip for wireless communication (BMC chip);
- Model for ADSL modem;
- Automatic electronic meter data reading system;
- High-speed modem ADSL;
- 3rd generation mobile phone (IMT-2000);
- Digital and voice dialing answering machine;
- Adjustable antenna;
- Voice access to PIN-phone software;
- Smart telephone;
- Agent model development for network management system;
- Web terminal model; and
- IP telephone model.

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Biotechnology

- Development of rice gene test kit from rice grain;
- System to test molecular markers for rice species;
- Technology to produce Nuclear Polyhedrosis Virus (NPV) for insect control;
- Development of fungi *trichoderma* as biopesticides;
- Technology to produce the fungi *Hirsuella thomsonii* for pest control;
- Development of *Bacillus thuringiensis* bacteria for pest control;
- PCR diagnostic technology;
- Anti-malaria drug from medicinal plant; and
- Anti-TB drug from medicinal plants.

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Analog function circuit design for communication

The developments of some analog functional circuit have been carried out in bipolar and CMOS technologies as the fundamental blocks. These basic functional circuits are squaring, square root, oscillator, multiplier, frequency doubler, floating variable resistance and grounded variable resistance. The designing step starts with the design technique. The simulation will be carried by using the simulator. The hardware circuit has to be done to find out the comparison of theoretical, simulating and experimental results.

3D visualization from x-ray radiograph

In this technique, a series of x-ray radiograph is taken at a number of angles around the subject to mimic a discrete CT scan. Each line of the digitized x-ray radiograph, taken from different angles is served as a projection data, which is then used for 2D tomographic image reconstruction from projection. Once tomographic image is constructed, surface render-

ing is then performed on a volumetric data constructed from a series of the 2D-constructed tomographic image.

Intelligent car navigation system

A heuristic search is used to find an optimal path to travel from one place to another in the map. Syntactic pattern recognition is used to analyze car position and movement collected from GPS receiver. The result of this analysis is used to display and guide car movement on the map.

Switched-beam-element phased array antenna for wireless communications

The switched-beam-element phased array antenna increases the degree of freedom rather than increasing the number of array elements. A four-element circular array antenna is designed to be able to switch a beam in 4 directions by using 1-bit phase shifters. By applying the switched-beam element as an array element, 10 radiation patterns for one main beam direction and an increase in the number of nulls can be observed. In order to evaluate the performance of the antenna, correlation coefficient, diversity gain and SIR improvement are estimated from the knowledge of radiation patterns.

Microstrip-excited rectangular ring antenna

The microstrip excited rectangular ring antenna consists of the efficient theory of the finite-difference time-domain method which is used to design the antenna.

Slot antenna coupled by microstrip line for dual frequency

This antenna consists of two slots on the left and right side of the microstrip line in the shape of a ladder, one allocated as a mirror image of the other. Characteristics of a slot antenna fed by a microstrip line are proposed and analyzed, e.g input impedance, S parameter and far field patterns of radiation.

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Microsensor and micromechanical devices

- A force sensor, an acceleration sensor and a flow sensor are based on a common idea that the very thin silicon beam can bend when force is applied. These type of sensors are particularly useful in industrial and automobile application.
- A SAW (Surface Acoustic Wave) device has been developed by using the obtained silicon etching technique. The device is expected to operate at the frequency of 400 MHz or nearby range.
- A micromotor, a very tiny piece of a silicon disc is fabricated using the similar technique. n-pole (negative) and p-pole (positive) are created by means of impurity diffusion process. With the proper arranged rotating electric field, this silicon disc can rotate and act as a conventional motor's rotor.

Superconductor

An economic way to prepare a high T_c superconductor device has been developed. The material is Y-Ba-Cu-O based

and works well at the liquid Nitrogen temperature environment. This device can be used in applications such as Magnetic detector, Magnetic memory and Meissner effect applications.

Complementary metal oxide insulator semiconductor

CMOIS (Complementary Metal Oxide Insulator Semiconductor) is a solution for isolating p-device and n-device from each other by means of isolator. The device processing is much simpler since only few extra steps of the conventional CMOS process are required.

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Viet Nam

Corrosion technology

- Development and fabrication of optical modules and optoelectronic equipment for telecommunication;
- Development and application of modern measurement methods such as Raman and time resolution spectroscopy etc.;
- Development and fabrication of photo-luminescent materials;
- Development and fabrication of materials and components for imaging technology; and
- Development and fabrication of high power lasers and application.

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Energy technology

- Appropriate technologies for supplying electricity for remote areas without national electricity grid network;
- Stand-alone hybrid power stations using new and renewable energy resources in Viet Nam's remote areas;
- Small - scale wind power generators; and
- New technologies and equipment's for arrester protection on the electric power line.

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Electronic materials and devices

- Designing and installing of fiber-optic systems for LAN, traffic-controlling network, video-audio transmission, etc.;
- Manufacturing of nitrogen lasers to be used in medicine treatments;
- Fabrication of the photoreceptors for use in laser imaging technique; and
- Application of spectroscopic technique in the identification and treatments of gemstones.

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Optics and spectroscopy

- Development and fabrication of optical modules and optoelectronic equipment for telecommunication;
- Development and application of modern measurement methods such as Raman and time resolution spectroscopy, etc.;
- Development and fabrication of photonic materials based on glass doped rare-earth elements;
- Development and fabrication of photo-luminescent materials;
- Development and fabrication of materials and components for imaging technology; and
- Development and fabrication of high power lasers and application.

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Polymer and composite materials

- Protective and antifouling paints for marine ships; specific paints for corrosion protection of metals in bridges;
- Chemical resistant composite materials used in petrol industry;
- Electric isolant composite materials used in high voltage transmission line; and
- Application of modification resist for making composite materials by hot pressing technology.

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