

**Instituto de Investigaciones Fisicoquímicas Teóricas y Aplicadas (INIFTA)**

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**Director/Head:** Alejandro Jorge Arvia.

**Number of Research Scientists:** 93; **Number of Staff:** 22.

**Scientific Fields of Interest:** Energy; Materials; Chemistry; Environment.

**Main Lines of Research and Training Activities:** Gas phase and solution reaction kinetics; photochemistry; physical and chemical adsorption; surface chemistry related to heterogeneous catalysis; electrochemistry; electrocatalysis; spectroelectrochemistry; metal electrodeposition; phase change phenomena and growth patterns; metallic corrosion and passivity; electroless coatings; bioelectrochemistry; electrochemical energy conversion and storage; physical chemistry of natural and synthetic polymers; polymerization reactions; modelling of chemical and physical processes.

**Major Scientific Results or Products:** Each year, more than 60 articles published in refereed international journals; since 1946, supervised 150 doctoral approved by University of La Plata and other universities in Argentina and foreign countries.

**Main Research Facilities Available:** Auger spectrometer; mass spectrometer; IR and UV spectrometers for bulk and surface reflection studies; transmission electronic microscope; atomic force microscopy; scanning tunnelling microscope; X-ray diffractometer; nuclear magnetic resonance equipment; electron paramagnetic resonance equipment; electronic equipment and facilities for electrochemical studies; vacuum equipment for thin metal film studies; advanced equipment for polymer science research; 30 PCs; glass-blowing facilities; mechanical workshop; library.

**Future Development Plans:** To continue projects in main research lines.

**Cooperation Arrangements with Developing Countries:** Cooperation agreements and scientific exchange programmes with universities and research centres in Uruguay, Brazil, Chile, Mexico, Colombia, Venezuela, Bolivia, Panama, Peru and Saudi Arabia. Participant in TWAS Associate Membership Scheme in Centres of Excellence in South.

**Other International Cooperation Arrangements:** Joint research programmes and scientific exchange with institutes and centres in US, Germany, France, England, Japan, Italy and Spain through Argentine National Research Council (CONICET), National Science Foundation, US, CNRS, France, British Council, Royal Society, England, DAAD, von Humboldt Foundation, Volkswagenwerk Foundation, Germany, JICA, Japan, CSIC, Spain, TWAS, Italy, and Organization of the American States (OAS).

**Research Center in Inorganic Chemistry and National Laboratory for Research and Services in Optical Spectrophotometry (CEQUINOR-**

**Address:** CONICET, UNLP, Departamento de Química, Facultad de Ciencias Exactas, Universidad Nacional de La Plata, C.C. 962 (1900), La Plata, Argentina. **Phone:** (+54 21) 214037/259485; **Fax:** (+54 21) 214037/259485; **E-mail:** quinor@biol.unlp.edu.ar.

**Director/Head:** Pedro J. Aymonino.

**Number of Research Scientists:** 20; **Number of Staff:** 7.

**Scientific Fields of Interest:** Materials; Chemistry; Environment; Mathematics; Physics/Astronomy.

**Main Lines of Research and Training Activities:** Coordination complexes, oxidic solids, minerals, covalent halogenated compounds, structural, spectroscopic (vibrational, electronic), thermal (TGA, DTA) and magnetic studies. Theoretical studies on heterogeneous catalysis, electrochemistry and drugs design. Applications of perturbation theory and variational approximations in quantum chemistry.

**Major Scientific Results or Products:** Preparation and characterization of new compounds and systems in inorganic and bio-inorganic chemistry; development and application of models to understand physical, chemical, physicochemical, and biological properties; contributions to understanding of catalysis, pharmacology and mineralogy.

**Main Research Facilities Available:** Perkin Elmer IR spectrophotometers # 457 and 580B; SPEX Raman spectrophotometer Ramalog # 1403, Shimadzu UV 300 and Hewlett-Packard 8452A UV-VIS

spectrophotometers, dispex cryostat, RIGAKU powder X-ray diffractometer Miniflex, CAHN magnetic balance, Shimadzu thermal analysis equipment (TGA and DTA # 50H/1500 C). BAS electrochemistry equipment (cyclic voltametry, potenciostat), SCHOTT automatic titrator, VARIAN gas chromatograph, Karl Kolb isometer. Direct access to FTIR spectrophotometers Bruker 66 and 113v of associated National Laboratory for Research and Services in Optical Spectrophotometry (LANAIS EFO) and to X-diffraction facilities of National X-ray Diffraction Laboratory (LANADI).

**Future Development Plans:** Improve facilities and equipment; expand international activities; pursue main lines of research.

**Cooperation Arrangements with Developing Countries:** Brazil, Chile, Uruguay, Venezuela. Doctorate students from Colombia and Peru.

**Other International Cooperation Arrangements:** Cooperation arrangement with Prof. Heinz Oberhammer, Tübingen, Germany, sponsored by Antorchas Foundation, Argentina and DAAD, Germany.

## Brazil

### Universidade de So Paulo Instituto de Química (IQUSP)

**Address:** Instituto de Química, Universidade de São Paulo, Av. Prof. Lineu Prestes 748, Butantan, São Paulo 05508-900, Brazil. **Phone:** (+55 11) 818-2829; **Fax:** (+55 11) 815-5579, 211-2858; **E-mail:** walcolli@fox.cce.usp.br, wacolli@usp.br.

**Director/Head:** Walter Colli.

**Number of Research Scientists:** 100; **Number of Staff:** 226.

**Scientific Fields of Interest:** Biochemistry/Biophysics; Chemistry; Environment.

**Main Lines of Research and Training Activities:** *Biochemistry:* Genetic and Developmental Control in Yeasts and Lower Eukaryotes; Peptide Chemistry and Site-directed Mutagenesis of Proteins; Photobiology, Bioluminescence and Active Oxygen Species; Cellulose Degradation and Carbohydrate Metabolism; Mechanisms of Intracellular Parasitic Invasion; Oncogenes, Growth Factors and Viral Antigens; Membranes and Organized Biomimetic Systems; DNA Repair and Biochemical Pharmacology; Molecular Biology and Biotechnology; Lipid Chemistry and Function; Insect Biochemistry. *Chemistry:* Ion-molecules Reactions and Gas Phase Collision Phenomena; Electrochemistry and Electroanalytical chemistry; Surface and Interfacial Chemistry and Catalysis; Spectroscopy (vibrational, electronic); Analytical and Environmental Chemistry; Phytochemistry and Natural Products; Inorganic Synthesis and Reactivity; Organic Synthesis and Reactivity; Coordination Chemistry; Quantum Mechanics; Photochemistry.

**Major Scientific Results or Products:** Organic synthesis with tellurium and selenium compounds; development of theory and experimental work on excitation energybiological systems; definition of membrane components of parasitic protozoa related to invasion of mammalian cell lines; average one international publication per staff member each year.

**Main Research Facilities Available:** 35,000 square metres; 300 microcomputers; ethernet network; access to mainframe computers; 500 MHz and 200 MHz NMR; mass spectra; ESR equipment; laser spectroscopy; infrared equipment; centrifuges; aminoacid sequencing; chemical synthesis of DNA; peptide synthesis; FACS. Library (includes 500 journal subscriptions) with main focus on chemistry.

**Future Development Plans:** Hire people in solid state chemistry; polymer chemistry; molecular biology; molecular modelling; molecular ecology.

**Cooperation Arrangements with Developing Countries:** Cooperation among scientists, not among institutions. Within Latin America, cooperation most often takes place with Argentina and Chile.

**Other International Cooperation Arrangements:** Individual cooperation exists mainly with USA, France and Germany.

## Universidade Estadual de Campinas (UNICAMP) Instituto de Química

**Address:** Caixa Postal 6154, 13083-970 Campinas, SP, Brazil. **Phone:** (+55 192) 3911110; **Telex:** +55 19 1150; **Fax:** (+55 192) 393805; **E-mail:** diriq@iqm.unicamp.br.

**Director/Head:** Fernando Galembeck.

**Number of Research Scientists:** 75; **Number of Staff:** 82.

**Scientific Fields of Interest:** Chemistry.

**Main Lines of Research and Training Activities:** Analytical separation methods; Electrochemistry; Electron microscopy; Atomic and molecular spectroscopy; Environmental chemistry; Mass spectrometry; Biological chemistry; Materials science; Polymers; Natural products chemistry; Biomass; Carbochemistry and petrochemistry; Solid state chemistry; Chemometrics; Homogeneous and heterogeneous catalysis; Nuclear magnetic resonance; Chemistry of concrete and fibres; Photochemistry and photobiochemistry; Colloid chemistry; Radiochemistry; Radioanalytic chemistry and radiation chemistry; Coordination chemistry and organometallic compounds; Spectroanalytical methods; Development and application of analytical instrumentation; Theoretical chemistry; Ecological chemistry; Synthesis and mechanisms in organic chemistry; Electroanalytical methods; X-ray crystallography.

**Major Scientific Results or Products:** Scientific results, which cover many research areas, are published in about 100 research papers each year; 10 patents filed in past four years, three of which were negotiated with large industrial concern.

**Main Research Facilities Available:** Nuclear magnetic resonance spectrometers, mass spectrometers, pentaquadrupolar mass spectrometer, IR-FTIR spectrophotometers, UV-vis absorption spectrophotometers, reflective spectrophotometer, spectrofluorimeter, atomic emission and absorption spectrometers, X-ray diffractometers, X-ray fluorescence, X-ray dispersion spectrometer, CHN elemental analyser, polarograph, polarimeters, surface area analyser, amino acid analyser.

**Future Development Plans:** Continue to pursue main research lines: materials chemistry, synthetic chemistry, natural products, analytical methodology. More emphasis will be placed on materials recycling, environmental chemistry, biotechnological synthetic procedures and low-waste chemical processes.

**Cooperation Arrangements with Developing Countries:** Autonomous University of Mexico.

**Other International Cooperation Arrangements:** Development of NADH electrochemical biosensor to conduct, for example, ECU 360,000/CEE synthetic, structural, spectroscopic, kinetic and catalytic studies on transition metal clusters containing novel unsaturated phosphorous ligands and their comparative behaviour with organic molecules.

## Universidade Federal do Rio de Janeiro (UFRJ) Instituto de Macromolculas, Professora Eloisa Mano (IMA)

**Address:** Caixa Postal 68525, 21945-970 Rio de Janeiro, RJ, Brazil. **Phone:** (+55 21) 270-1035; **Fax:** (+55 21) 270-1317.

**Director/Head:** Ailton de Souza Gomes.

**Number of Research Scientists:** 22; **Number of Staff:** 23.

**Scientific Fields of Interest:** Materials; Chemistry; Engineering/Technology.

**Main Lines of Research and Training Activities:** Modification of natural and synthetic polymers; Ziegler-Natta catalyst polymerization; synthesis of both ion exchange resins and graft copolymers; cationic and anionic polymerization; polymer-solvent interaction; hydrosoluble polymers; polymer blends; rheology of polymers; elastomeric composites; liquid crystal polymers; industrial polymers identification; recycling of plastic waste; collaboration with Brazilian polymer industry.

**Major Scientific Results or Products:** Preparation of highly qualified personnel in polymer field. Several research programmes designed to respond to industry requests have contributed to development of technology in Brazilian polymer industry.

**Main Research Facilities Available:** All major research instruments in polymer field (e.g., GPC, GC, UV-VIS- near IR, FTIR, DSC, TMA, TG, NMR); computers; library, specializing in polymers, contains bibliographic search service that serves industries and universities across country.

**Future Development Plans:** Expand building; strengthen links with institutions in foreign countries to enhance research through exchange of staff.

**Cooperation Arrangements with Developing Countries:** Scientific exchange with universities in Chile and Argentina.

**Other International Cooperation Arrangements:** CERMAV (Grenoble, France), Instituto de Ciencia y Tecnologia de Polimeros (Madrid, Spain) and Tokyo Institute of Technology (Japan). Have recently developed similar programmes with National Academy of Science, USA; KFA (Germany); and Centre National de la Recherche Scientifique (CNRS), France.

## China

### Chinese Academy of Sciences (CAS) Changchun Institute of Applied Chemistry

**Address:** 109 Stalin Street, Changchun, Jilin 130 022, China. **Phone:** (+86 431) 682801; **Telex:** 83063 CHIAC CN; **Fax:** (+86 431) 685653.

**Director/Head:** Erkang Wang.

**Number of Research Scientists:** 270; **Number of Staff:** 1,100.

**Scientific Fields of Interest:** Energy; Materials; Chemistry; Environment.

**Main Lines of Research and Training Activities:** Fundamental and applied research in chemistry, including polymer chemistry and physics, physical chemistry, organic chemistry, inorganic chemistry and analytical chemistry. Training PhD and MSc students.

**Major Scientific Results or Products:** Discovery of rare-earth coordination catalysts for stereospecific polymerizations; isolation and purification of rare-earth elements and preparation and investigation on properties of new rare-earth compounds; new electroanalytical methods and theories; polyamide and other high-performance resins; functional polymers, especially conducting and nonlinear optical polymers.

**Main Research Facilities Available:** Electron microscopes; four circle X-ray diffractometer; NMR spectrometers; mass spectrometers; infrared and Raman spectrometers; electronic accelerator, <sup>60</sup>Co sources; scan tunnel microscope; atomic force microscope; computer system; library.

**Future Development Plans:** Enhance research on electroanalytical chemistry; rare-earth chemistry and physics; polymer synthetics chemistry; polymer physics; spectroscopic and structural chemistry.

**Cooperation Arrangements with Developing Countries:** Short-term research fellows from India.

**Other International Cooperation Arrangements:** Bilateral collaboration agreements with scientists from USA, Germany, England, France, Italy, Japan and Russia.

### Chinese Academy of Sciences (CAS) Dalian Institute of Chemical Physics (DICP)

**Address:** 161 Zhong Shan Road, P.O. Box 100, 116 012 Dalian, China. **Phone:** (+86 411) 331841, 332426; **Telex:** 86436 DICO CN; **Fax:** (+86 411) 332426.

**Director/Head:** Yuan Quan.

**Number of Research Scientists:** 1,010; **Number of Staff:** 356.

**Scientific Fields of Interest:** Biochemistry/Biophysics; Energy; Materials; Chemistry; Engineering/Technology; Environment.

**Main Lines of Research and Training Activities:** Catalytic chemistry; organic chemistry; engineering chemistry; chemical laser and laser chemistry; molecular reaction dynamics; modern analytical chemistry with emphasis on gas chromatography; biochemical engineering. Since 1978, 441 graduate students have worked on master's and 143 on doctorate degrees. In 1987, established mobile station for postdoctorates in physical chemistry.

**Major Scientific Results or Products:** Technologies for producing toluene by cyclization of C7-fraction of petroleum and synthesis of liquid fuel from syn gas; development of hydrocracking isomerization catalyst and catalysts for new process of feed gas purification for ammonia synthesis; catalysts for altitude control of spacecrafts; development of hollow fibre type membrane separator for nitrogen and hydrogen.

**Main Research Facilities Available:** Sophisticated research instruments and equipment; more than 100 computers; library.

**Future Development Plans:** Enhance current activities in basic and applied research and technology development; strengthen international academic exchanges and collaborations.

**Cooperation Arrangements with Developing Countries:** Ties with more than 30 countries.  
**Other International Cooperation Arrangements:** Cooperation with University of California at Berkeley, USA; University of Birmingham, UK; Université Catholique de Louvain, Belgium; University of Tokyo, Japan. Montecatini Tecnologie, Italy.

## **Chinese Academy of Sciences (CAS) Fujian Institute of Research on the Structure of Matter**

**Address:** P.O. Box 143, Xihe, Fuzhou, Fujian 350 002, China. **Phone:** (+86 591) 3714517, 3714946; **Telex:** 92219 FIRSM CN; **Fax:** (+86 591) 3714946.

**Director/Head:** Huang Jin-shun.

**Number of Research Scientists:** 110; **Number of Staff:** 600.

**Scientific Fields of Interest:** Materials; Chemistry.

**Main Lines of Research and Training Activities:** Institute focuses on structural chemistry, material science of technological crystals, catalysis, prevention of metal corrosion and electrochemical research. Each year, about 25 graduates join Institute while working on PhD or MSc degrees. Institute arranges extensive academic exchanges and cooperative scientific exchanges with scientific institutions and industrial enterprises in neighbouring regions and foreign countries. Each year, 10 to 15 distinguished scientists give keynote lectures during workshops; about 45 scientists and students from China and other developing countries participate in these activities.

**Major Scientific Results or Products:** Since its establishment in 1960, Institute has formed two major research programmes: structural chemistry in field of transition metal cluster and material science in field of new technological crystals. Latter has led to development of "China Brand" BBO and LBO crystals that have won international recognition. As of 1993, Institute has won 178 national scientific achievements awards, including 76 significant national achievement awards and three international awards. Institute has obtained 16 patents, three of which were authorized by USA, and has published more than 1600 papers in national and international scientific journals. Institute also publishes international scientific journal, *Jiegou Huaxue (Chinese Structural Chemistry)*: four issues a year in English and two in Chinese.

**Main Research Facilities Available:** Laboratories: State Key Laboratory of Structural Chemistry, Laboratory of Structural Chemistry, Laboratory of Applied Chemistry. **Equipment:** 0.01MUSD-0.05MUSD: 50 PCs; over 0.05MUSD: 25 pieces. **Computer Center:** WAX-11/785 (1), 2RZS/W-4D25G(1), W-4D25TG(1), PDP-11/70(1), COMPAQ-PL4/50 and 486/50(4), Super-386(5), AST286(7), IBMPCs(22). **Library:** more than 240,000 volumes and 175,000 serials and periodicals. **Editorial office:** *Jiegou Huaxue (Chinese Structural Chemistry)*.

**Future Development Plans:** Institute will continue to oversee high-level research and training activities for China and other developing countries in high technology materials. Institute will continue to provide services to national economy and promote international cooperation in science and technology.

**Cooperation Arrangements with Developing Countries:** FIRSM and University of Karachi, Pakistan: research on structure and function of single chain ribosome inactivating protein.

**Other International Cooperation Arrangements:** Università di Bologna, Italy, cooperation programme between Academia Sinica and Italian National Research Council in field of biochemistry; University of Newcastle-upon-Tyne, UK, on chemistry of transition metal clusters; Hong Kong University and Hong Kong Chinese University, on synergistic effect in transition metal compounds.

## **Nanjing University Coordination Chemistry Institute (CCINU)**

**Address:** 22 Hankou Road, Nanjing 210093, China. **Phone:** (+86 25) 6634651-2969; **Telex:** 34151 PRCNU-CN; **Fax:** (+86 25) 3317761.

**Director/Head:** Xiao-zeng You.

**Number of Research Scientists:** 72; **Number of Staff:** 8.

**Scientific Fields of Interest:** Biology; Biochemistry/Biophysics; Materials; Chemistry; Environment; Medical Sciences.

**Main Lines of Research and Training Activities:** Coordination chemistry; bio-inorganic chemistry; interface coordination chemistry; structure and function of coordination compounds; organometallic chemistry; supermolecular chemistry.

**Major Scientific Results or Products:** Published more than 10 monographs and 800 papers in domestic and foreign journals; received National Natural Science Award; won 21 ministerial and provincial awards.

**Main Research Facilities Available:** Bruker Am-500 NMR; UV 3100 ultraviolet-visible-near infrared S-600 Mössbauer spectrometer; CAHN-2000 magnetic balance; computer station; library with 90,000 volumes.

**Future Development Plans:** Enhance reputation of Institute as international centre for research and education in field of coordination chemistry.

## Egypt

### Ain Shams University Department of Chemistry

**Address:** Abbassia, Cairo, Egypt. **Phone:** (+20 2) 822284; **Fax:** (+20 2) 822284/2847822 ; **E-mail:** solar@egfrcuvz.bitnet.

**Director/Head:** A. Rabie.

**Number of Research Scientists:** 140; **Number of Staff:** 30.

**Scientific Fields of Interest:** Materials; Chemistry.

**Main Lines of Research and Training Activities:** 1. Synthesis and characterization of new organic and organometallic materials of industrial and biological potentials. 2. Surface and catalysis studies. Thermal and structural studies on solids. 3. Polymer chemistry: physical and synthetic studies. 4. Molecular Spectroscopy of Inorganic complexes and Laser Dyes. 5. Photophysics and photochemistry of molecules. 6. Computers in Chemistry and theoretical chemistry. 7. Polarography, Corrosion and electroplating. 6. Analytical (spectroscopy and electrochemical) and Inorganic reactions (structure determination, kinetics and mechanisms).

**Major Scientific Results or Products:** Publications and patents in major fields of chemistry: synthesis of new materials (organic, inorganic and organometallic); contributions to fields of analytical, physical (polymer, catalysis, surface, corrosion, spectroscopy), inorganic and computer chemistry, cement chemistry and environmental protection and safety.

**Main Research Facilities Available:** Spectrophotometers (UV-VIS, FTIR, luminescence), corrosion unit, DTG, DTA, elemental analysis unit, 200MHz, mass spectrometer, HPLC, GCMS, library, four PCs (IBM) and software for quantum chemistry.

**Future Development Plans:** Establishment of research units for environmental studies, photochemistry and solar energy, lasers, cement chemistry, catalysis, corrosion and electroplating.

**Cooperation Arrangements with Developing Countries:** Exchange of professors.

**Other International Cooperation Arrangements:** Exchange of students and professors with developed countries. Cooperated and received support from ICS for organization of last two international conferences on Solar Energy Storage and Applied Photochemistry.

## Ethiopia

### Addis Ababa University Department of Chemistry

**Address:** P.O. Box 1176, Addis Ababa, Ethiopia. **Phone:** (+251 1) 126276; **Telex:** 21205 ; **E-mail:** chemistry.aau@telecom.net.et.

**Director/Head:** Hailemichael Alemu.

**Number of Research Scientists:** 28; **Number of Staff:** 10.

**Scientific Fields of Interest:** Biochemistry/Biophysics; Chemistry; Environment; Marine.

**Main Lines of Research and Training Activities:** Analytical chemistry; inorganic chemistry; bio-inorganic chemistry; natural products chemistry; marine chemistry; organic synthesis; electroanalytical chemistry, electrochemistry.

**Major Scientific Results or Products:** Publications in major journals.

**Main Research Facilities Available:** Adequate facilities.

**Cooperation Arrangements with Developing Countries:** NAPRECA scholarships: students from East and Central Africa participate in programme.

**Other International Cooperation Arrangements:** Department of Research Cooperation (SAREC) of Swedish International Development Agency (Sida), UN Development Programme (UNDP), UN Educational, Scientific and Cultural Organization (UNESCO).

## India

### Council of Scientific and Industrial Research (CSIR) Central Drug Research Institute (CDRI)

**Address:** Chattar Manzil, Post Box No.173, Lucknow 226 001, India. **Phone:** (+91 522) 234219, 243286. **Telex:** 0535- 286/0535-344CDRI IN; **Fax:** (+91 522) 243405; **E-mail:** root%cdriik@sinetd.ernet.in.

**Director/Head:** C.M. Gupta.

**Number of Research Scientists:** 261; **Number of Staff:** 758.

**Scientific Fields of Interest:** Biology; Biochemistry/Biophysics; Chemistry; Veterinary Sciences; Medical Sciences; Drug development.

**Main Lines of Research and Training Activities:** Exploration of terrestrial plants, including Indian traditional remedies, and marine flora and fauna for novel molecules for drug development; development of contraceptives; new drugs for tropical diseases (malaria, filariasis, leishmaniasis, tuberculosis) cardiovascular and central nervous system disorders, hepato-protection, wound healing, osteoporosis, allergy and fungal infections; development of chemical/fermentation technologies for drugs, drug intermediates, biological and fermentation products; basic research to obtain new leads for drug development; short-term training 'Advanced Technology Training Programme' in 18 specialities; *ad-hoc* training in techniques in drug research on request and technician training in maintenance of laboratory animals.

**Major Scientific Results or Products:** About 5000 research papers and review articles in Indian and foreign journals; 350 Indian and foreign patents; and 18 books written or edited. New drugs/products marketed: Centchroman, non-steroidal oral contraceptive for females; Isapent, cervical dilator for medical termination of pregnancy; Gugulipid, hypolipidemic; Centbucridine, local anaesthetic. New products licensed for marketing: palatable herbal laxative; chandonium iodide, neuromuscular blocking agent; leishmaniasis diagnostic kit. Major technologies commercialised: 1-ephedrine hydrochloride; 1-acetylphenyl carbinol; pyriithoxin; dextropropoxyphene hydrochloride. Other process technologies in commercial production/licensed: Clofazimine; Ibuprofen; D-2-aminobutanol; N-methylpiperazine.

**Main Research Facilities Available:** *Regional Sophisticated Instrumentation Centre (RSIC):* analyses of samples and scanning and transmission electron microscopy. *National Laboratory Animal Centre (NLAC):* Supply of laboratory animals, including germ free and SPF animals and standard cell lines and cell cultures. *Parasite Bank:* Maintenance and supply of standard strains as well as Indian isolates of malaria, filaria and leishmania parasites and their vectors for research purpose. *National Information Centre for Drugs and Pharmaceuticals (NICDAP):* information services, including current awareness bulletins, computerised literature search and reprographic services. *Medicinal Plants Herbarium:* 50,000 specimens covering 5000 taxa of flowering plants and ferns preserved for authentication of medicinal plants. *Primary Biological Screening:* evaluation of synthetic compounds/natural products/marine flora and fauna extracts in about 170 *in vitro/in vivo* test systems.

**Future Development Plans:** Strengthening areas of molecular biology and clinical pharmacology; development of *in vitro* receptor, enzyme and cell based test systems as primary screens.

**Cooperation Arrangements with Developing Countries:** Science and technology cooperation programme among CSIR-Nepal/Bangladesh/Bhutan/Sri Lanka and Thailand.

**Other International Cooperation Arrangements:** INDO-US Vaccine Action programme; INDO-RUSSIA Integrated Long-Term Project; National Cancer Institute, USA; Walter Reed Army Institute of Research, USA; World Health Organization, Geneva.

### **Council of Scientific and Industrial Research (CSIR) Central Electrochemical Research Institute (CECRI)**

**Address:** Karaikudi 630006, Tamilnadu, India. **Phone:** (+91 4565) 22064; 22065; **Telex:** 0443-211; 0443-222 ECRI IN; **Fax:** (+91 4565) 22088; 23213; 23526; **E-mail:** cecrik@cscecri.ren.nic.in.

**Director/Head:** G.V. Subba Rao.

**Number of Research Scientists:** 200; **Number of Staff:** 400.

**Scientific Fields of Interest:** Energy; Materials; Chemistry; Environment; Marine Sciences; Electrochemistry.

**Main Lines of Research and Training Activities:** R&D in the following areas: Corrosion science and engineering; Industrial metal finishing; Batteries and fuel cells; Electrometallurgy (hydro and pyro); Electronics and electrocatalysis; Electrochemicals; Electrochemical materials science; Electrochemical, electronics and instrumentation. Technology oriented refresher courses in the above areas. Four-year course - BTech in chemical and electrochemical engineering.

**Major Scientific Results or Products:** Development of electrochemical processes/products; scientific research papers; patents; doctorate and BTech degrees.

**Main Research Facilities Available:** Exposure studies in marine environment at Mandapam, Chennai, Tuticorin and Cochin; analytical instruments; mainframe computer; PCs; library.

**Future Development Plans:** Additional research and development as well as construction of modern advanced facilities in areas cited above.

**Cooperation Arrangements with Developing Countries:** Collaborative programmes with Thailand, China and other developing countries in main research areas.

**Other International Cooperation Arrangements:** Bilateral exchange programmes with developed countries, including Germany, France and USA. Collaborative programmes on specific areas with Poland and Czechoslovakia.

### **University of Hyderabad School of Chemistry**

**Address:** Hyderabad 500 134, India. **Phone:** (+91 842) 289221; **Telex:** 4242050 UHYD IN; **Fax:** (+91 842) 253145; **E-mail:** sen-Chemistry@uohyd.emet.in.

**Director/Head:** Kalidas Sen.

**Number of Research Scientists:** 80; **Number of Staff:** 0.

**Scientific Fields of Interest:** Biochemistry/Biophysics; Materials; Chemistry; Mathematics; Physics/Astronomy.

**Main Lines of Research and Training Activities:** Research programmes in diverse areas of organic, inorganic, physical and theoretical chemistry. These include organic synthesis, reaction mechanism, photochemistry, bio-organic chemistry, physical organic chemistry, organometallics, solid state chemistry; inorganic chemistry of main group elements, coordination chemistry and bio-inorganic chemistry, applications of quantum chemistry; statistical mechanics and theoretical and experimental chemical physics. Training: MSc, MPhil and PhD in Chemistry.

**Major Scientific Results or Products:** Published about 125 papers, 1988-1991.

**Main Research Facilities Available:** Shimadzu electronic spectrophotometer; PE297 IR spectrophotometer; micropolarimeter; Spekol spectrometer; Packard gas chromatograph; Waters HPLC; automatic CHN analyser; membrane osmometer and differential refractometer; Padd hydrogenerator; Welsbach ozonator; MicroVAX 3300, Sun Sparc-I workstation; 486 micro computer, HP II laser printer and personal computer cell.

**Future Development Plans:** In addition to on-going programmes, following areas have been added during past few years: new materials, especially with such properties as superconductivity, ferromagnetism, electro-optical activity; supramolecular chemistry; cluster chemistry; bio-inorganic chemistry; density functionals, coupled cluster models for electron correlation, electronic structures of solids.



**International Cooperation Arrangements:** Although research collaboration exists at level of individual faculty and research groups, no financial assistance is received from abroad.

## Mexico

### **Centro de Investigacin y de Estudios Avanzados (CINVESTAV) Departamento de Qumica**

**Address:** Av. IPN 2508, 07300 México, D.F. Mexico. **Phone:** (+52 5) 747 7000 Ext. 4000; **Fax:** (+52 5) 747 7113.

**Director/Head:** Omar Solorza-Feria.

**Number of Research Scientists:** 17; **Number of Staff:** 42.

**Scientific Fields of Interest:** Chemistry.

**Main Lines of Research and Training Activities:** Organic physical chemistry; synthesis; natural products; organometallic chemistry; heteroelemental chemistry; electrochemistry; thermodynamics.

**Major Scientific Results or Products:** Papers published in international journals.

**Main Research Facilities Available:** NMR spectrometers (400, 300, 270 MHz); X-ray diffractometers (single crystals); mass spectrometer; calorimeters.

**Future Development Plans:** Considering expanding work in field of theoretical chemistry and increasing size of academic staff.

**Cooperation Arrangements with Developing Countries:** Small collaboration with different research groups.

### **Universidad Nacional Autnoma de Mxico (UNAM) Institute of Chemistry**

**Address:** Circuito Exterior, Ciudad Universitaria, Coyoacan, 04510 Mexico, D.F. Mexico. **Phone:** (+52 5) 5488205; **Telex:** 1760155 CICME; **Fax:** (+52 5) 5485448.

**Director/Head:** Francisco Lara.

**Number of Research Scientists:** 46; **Number of Staff:** 15.

**Scientific Fields of Interest:** Biochemistry/Biophysics; Chemistry.

**Main Lines of Research and Training Activities:** Natural products: (19 Research scientists). Structural elucidation of compounds of plant. Tests of biological activity. Organic synthesis: (9 Research scientists). Inorganic synthesis: (9 Research scientists) Catalysis and Organometallic compounds synthesis. Biochemistry: (5 Research scientists) Structural elucidation by x-ray of protein structures. Physical chemistry: (4 Research scientists). Quantum Chemistry Statistical Thermodynamics and Dynamical calculations.

**Major Scientific Results or Products:** In past 50 years, Institute has published nearly 1100 papers in international and national journals. In past 25 years, Institute has supervised 28 PhD theses, 71 MSc theses and 519 BSc theses.

**Main Research Facilities Available:** NMR-200 MHz (2), NMR-300 MHz (1), NMR-500 MHz (1), X-ray (3) and infrared (2) equipment, UV (2), HPLC (10), GC (3), mass spectrometry (1), high resolution MS (1).

**Future Development Plans:** Build up laboratories focusing on electronic paramagnetic resonance and gases fast kinetics; develop field of biostructure with use of X-rays and NMR and computer simulations.

**Cooperation Arrangements with Developing Countries:** Exchange with several university chemistry departments in USA.

# Pakistan

## University of Karachi Husein Ebrahim Jamal (H.E.J.) Research Institute of Chemistry

**Address:** University of Karachi 75270, Pakistan. **Phone:** (+92 21) 4968497, 4968733; **Telex:** 28095 HEJRI PK; **Fax:** (+92 21) 4963373, 4963124; **E-mail:** [atta%hejfirst@uunet.uu.net](mailto:atta%hejfirst@uunet.uu.net).

**Director/Head:** Atta-ur-Rahman.

**Number of Research Scientists:** 100; **Number of Staff:** 110.

**Scientific Fields of Interest:** Organic Chemistry; Biochemistry/Structural Chemistry; Pharmacology.

**Main Lines of Research and Training Activities:** Institute has largest doctoral programme in Pakistan, with more than 100 PhD students working on organic chemistry, biochemistry and pharmacology.

Following are main research areas: natural products chemistry; protein chemistry; synthetic organic chemistry; X-ray crystallography of micromolecule; spectroscopy; marine chemistry; enzyme chemistry.

**Main Research Facilities Available:** Five NMR instruments (two 500 MHz, one 400 MHz, two 300 MHz); X-ray diffractometer; six mass spectrometers (five high resolution double focusing and small VG MS used for training); amino acid sequencer; amino acid analyser; FT-IR spectrometer; IR spectrometers; UV spectrometers; gas chromatographs; 18 HPLC systems; CD spectropolarimeter, polarimeters; elemental analyser; helium and nitrogen liquefaction systems; cold rooms; large-scale pilot plant extraction set-up; glass-blowing section; pharmacological testing instruments, including grasse polygraphs;  $\beta$ -counter;  $\gamma$ -counter; uninterruptable power supply systems.

**Major Scientific Results or Products:** About 200 scientific papers, 1993-1994.

**Future Development Plans:** Upgrading Institute to international centre for chemical sciences and technology under TWNSO/TWAS/UNIDO initiative. Institute will concentrate on following fields: food and pharmaceutical chemistry; industrial chemistry and pilot plant applications; computational chemistry; biotechnology; biomolecular chemistry; protein engineering and X-ray crystallography; organometallic chemistry and biocatalysis.

**Cooperation Arrangements with Developing Countries:** Collaboration with countries in South, including Bangladesh, Sri Lanka, Jordan, Turkey, Ethiopia, Egypt and Chile. Institute plans to develop research collaboration with scientists from newly formed central Asian Republics.

**Other International Cooperation Arrangements:** Institute engages in variety of collaborative research programmes with University of Calgary, Cornell University, University of Munich, University of Sussex, University of Tübingen, University of Washington, NIH, Abbott Laboratories and Biogen. UK, USA and Germany have donated equipment.

# Venezuela

## Instituto Venezolano de Investigaciones Científicas (IVIC) Centro de Química

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**Director/Head:** Alejandro Arce.

**Number of Research Scientists:** 24; **Number of Staff:** 57.

**Scientific Fields of Interest:** Chemistry.

**Main Lines of Research and Training Activities:** Isolation and synthesis of natural products with biological activity; surface science and catalysis applied to oil and gas conversion; physical organic chemistry of molecular reactions in gaseous phase; density functional theory applied to atoms and molecules; Ab-initio and semi-empirical molecular orbital studies of chemical reactivity of catalytic materials; dynamics and mechanics of molecular aggregates in crude oils; development of analytical methods for determination of trace metals in biological fluids; photodegradation of pharmaceutical products; atmospheric chemistry and biogenic emissions in tropical areas; synthesis of organometallic

complexes both in oil refining and cure of tropical diseases; postgraduate studies in chemistry and chemical physics.

**Major Scientific Results or Products:** Published more than 50 articles in international journals in 1993; about 100 research reports prepared under contracts with oil and other industries.

**Main Research Facilities Available:** Multinuclear magnetic resonance spectrometer for high-resolution studies in solid and liquid state Bruker AM-300; CW magnetic resonance spectrometer Varian EM-390; Mass spectrometer Kratos MS25RFA with data system; Rigaku AFC7S single crystal diffractometer with low temperature facilities and computer control; IR spectrometer Nicolet 5DX; UV-visible spectrometer Perkin-Elmer; Dry boxes with controlled atmosphere. Fisons Elemental Analyser (CHNS-O), Perkin Elmer atomic absorption spectrophotometer and inducted coupled plasma emission spectrometer, Waters HPLC preparative chromatography system, Milton-Roy UV-VIS diode array spectrophotometer, Waters capillary electrophoresis apparatus, Waters peptide synthesizer.

**Future Development Plans:** Better integration with local industry, especially oil and petrochemical sectors; acquisition of new high-field NMR instrument and advanced IR spectrometer. Hiring of new researchers in following areas: organic, polymer, analytical, geo- and colloid chemistry. Construction of workstation network equal in computing power to supercomputer.

**Cooperation Arrangements with Developing Countries:** Departamento de Química, Universidad Nacional de Colombia, Bogotá, Colombia; Programa de Química Inorgánica, Universidad Nacional de La Plata, Argentina; Universidad de Santiago de Chile, Chile; Facultad de Matemática, Astronomía y Física, Universidad Nacional de Córdoba, Argentina; CNPq, Rio de Janeiro, Brazil.

**Other International Cooperation Arrangements:** Centre for Study of Chemical Reactivity in CNR, Milan, Italy; Department of Chemistry, Florence, Italy; University College of London, UK; International Institute for Pure and Applied Chemistry, Trieste, Italy.