

The Institute of Chemical Research of Catalonia (ICIQ)

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Introduction

In 2000, the Autonomous Government of Catalonia, aware of both the state of chemical research in Catalonia and the needs of the Catalan chemical industry, decided to create the *Institut Català d'Investigació Química* (Institute of Chemical Research of Catalonia, ICIQ) as an element of its scientific policy aimed at creating a network of research centers in strategic areas. The ICIQ was established in March 2004 and immediately sought to achieve a sufficient critical mass as well as to become a center of excellence in the European research area. Its long-term vision is to use molecular science in combined strategies aimed at solving major social and economic problems, thereby contributing to the formation of a knowledge-based economy in Catalonia and to improving the quality of life in the country.

Research in three areas

To this end, the ICIQ has focused its research on three main areas: (i) the catalysis of chemical processes, the Institute's most extensive line of research, as a key technology to achieve clean and sustainable production; (ii) supramolecular chemistry, as an entry to molecular nanotechnology; and (iii) renewable energies, the fastest growing field of research at the ICIQ. At present, the Institute hosts 18 research groups; these are led by senior and tenure-track researchers hired after a rigorous selection process. The ICIQ is especially proud of its Tenure Track Program, as a means to allow talented young researchers to start independent careers and thus to enrich Catalonia's science and technology system. To date, six ICIQ group leaders have joined the ICIQ through this program. Two senior group leaders have been awarded an ERC Advanced Grant, and two junior group leaders an ERC Starting Grant.

The ICIQ envisages a research model based on the collaboration of different research groups, internally and externally, and following a multidisciplinary approach. Consistent with this strategy, the ICIQ leads the INTECAT project for the development of an integrated approach to catalysis within the framework of the Consolider-Ingenio 2010 Program of the Spanish Ministry of Science and Innovation (MICINN) and participates in

the Photomol project of photovoltaic energy, funded by the MICINN in the program of the *Proyectos Singulares Estratégicos* (Singular Strategic Projects). In addition, it is involved in eight research projects (VISION CATALYSIS, ORGAPVNET, SOLAR H2, ACSEPT, ROBUST, POLYDOT, NANOSONWINGS and BIO2CHEM-d) of the 6th and 7th Framework Programmes of the European Union. The institute has also encouraged collaboration between ICIQ research groups and external groups by funding three research projects that tackle strategic and meaningful research areas in accordance with the ICIQ's research interests.

In terms of research output, between March 2004 and May 2010, the ICIQ published more than 600 scientific papers, reaching an h-index of 50. Additionally, a total of 24 patent applications were filed.



Fig.1. Entrance to the Institute of Chemical Research of Catalonia (ICIQ) facilities.

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Fig. 2. The ICIQ houses 26 research laboratories, 12 research support laboratories, and 4 technology rooms.

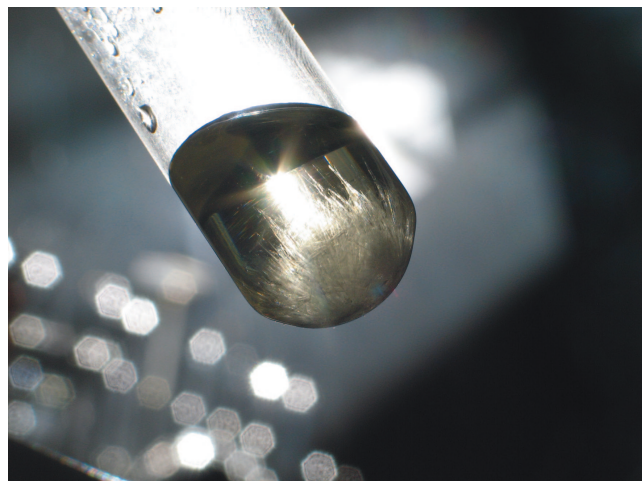


Fig. 4. Crysforma is the first technology unit created by the ICIQ. It offers support in the field of pharmaceutical solid-state development.

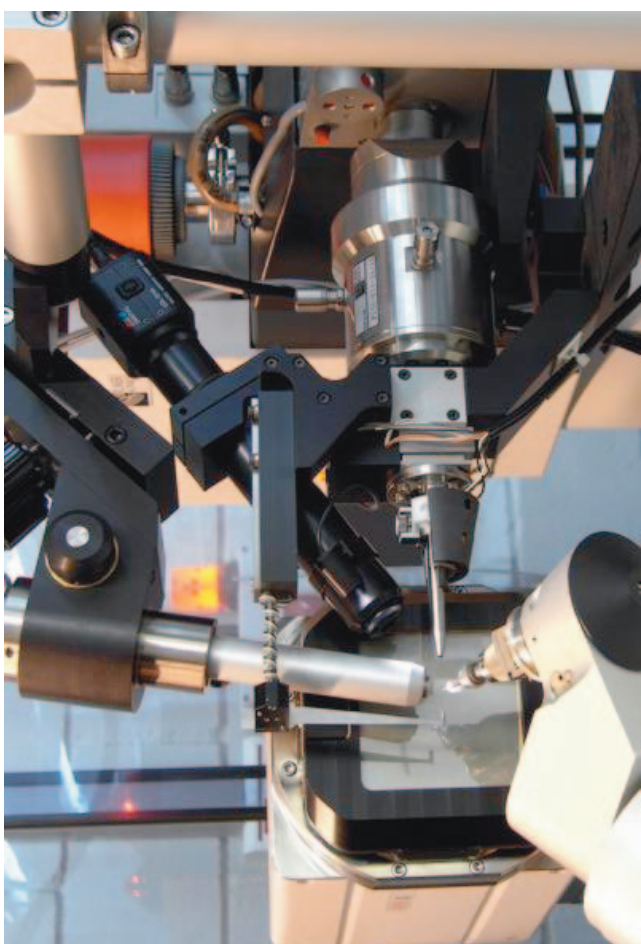


Fig. 3. A single crystal X-ray diffractometer in the X-ray diffraction unit laboratory.

Knowledge and technology transfer

The transfer of knowledge and technology to the pharmaceutical and chemical industry has been identified as an additional key point in the ICIQ's strategy and mission. The Institute is committed to improving the competitiveness of local chemical and pharmaceutical industries through an active policy that

promotes the transfer of research results, thereby contributing to the innovation and technological upgrade of these industrial sectors. It also supports the creation of high-tech businesses (spin-offs and start-ups) based on knowledge and technologies developed at the Institute. For this purpose, a complete floor of the ICIQ's Phase II, its second building, inaugurated in June 2009, is part of the *Parc Científic i Tecnològic de Tarragona* (Science and Technology Park of Tarragona, PCTT) and is entirely used to house a business incubator and joint ICIQ/industry units. At the moment, collaborative research projects between these joint units have been set up with two companies: Laboratorios Dr. Esteve and Henkel AG. For these collaborations, the ICIQ has provided a laboratory, access to its state of the art facilities and equipment, and the advisory support of its group leaders. In addition, two Technology Development Units have been created: Crysforma, resulting from the ICIQ's expertise in crystal engineering, is focused on providing scientific and technological support in the field of pharmaceutical solid-state development, while Intecat, arising from the ICIQ's very broad expertise in catalysis, seeks to commercially exploit the diverse catalyst libraries and the catalyst know-how developed at the Institute.

Educational task

The ICIQ's commitment to society also includes education. It has launched two fellowship programs: ICIQ Summer Fellowships, for undergraduate students, and Ph.D. Fellowships, which allow qualified students to enroll in the URV/ICIQ Master in Synthesis and Catalysis program and to pursue a doctoral degree. Also, the ICIQ Summer School and its Seminar Program ensure that ICIQ and URV-campus researchers intensively interact with research conducted by the world's most prestigious chemists. Finally, the ICIQ is active in organizing congresses and symposia, for instance, the 2nd China-Spain Bilateral Symposium on Catalysis, that was held in November 2010, and a symposium on calixarenes (Calix 11) that will take place in June 2011.

In summary, the ICIQ is strongly committed to the task of transforming our society into a more sustainable one. This goal demands target-oriented, top-quality research complemented by an active policy of technology transfer to improve the competitiveness of the pharmaceutical and chemical industries. Of equal importance is a strong commitment to education in order to ensure new generations of molecular scientists able to use chemistry to solve relevant problems. It is clear that the success of the ICIQ is also the success of a particular model of re-

search institution. The principles of flexibility and autonomy that define the research institutes created by the government of Catalonia are fundamental to the high level of performance of institutes such as the ICIQ. The investments in research made by the successive Autonomous Governments of Catalonia over the last decade have resulted in a giant step towards the implementation of a more knowledge-based economy. Hopefully, these efforts will be consolidated in the years to come, irrespective of the overall economic scenario.