



MINISTRY  
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Institute of Physical Chemistry "Rocasolano"  
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<http://www.xtal.iqfr.csic.es/>

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## The UN declares 2014 International Year of Crystallography

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The General Assembly of the United Nations in its meeting A66/L.51, issued on 06.15.2012 (<http://bit.ly/1rUIT54>), decided to proclaim 2014 International Year of Crystallography. Among several recitals, this resolution recognizes that understanding our material world is particularly due to this science and stresses that the teaching and application of Crystallography is essential to cope with multiple challenges that are essential for the development of humanity.

This resolution, which makes justice to 100 years of a persistent development of Crystallography, is celebrated by all crystallographers, by all those specialists working in Spain and especially by those that work in the research Institutes of the Spanish National Research Council (CSIC).

### What is Crystallography?

Crystallography is the science that explores the micro-world of atoms up to an incredibly detailed resolution. It has enabled us to find out how the crystals, molecules, hormones, nucleic acids, enzymes, proteins and viruses are, "seeing" in to their three-dimensional atomic structure. But even more, with the crystallographic results we can recognize nearly everything about the properties of all these type materials and/or compounds, and we can understand their functionality in a chemical reaction done in a test tube, or inside of a living being.

With the technical and scientific knowledge acquired through Crystallography we can produce materials with predesigned and controlled properties, from a chemical catalytic agent of industrial interest, up to toothpaste, vitro-ceramic glass plates, very hard materials for surgery use, or certain aircraft components, just to give a few examples. Thanks to Crystallography we knew the secrets of DNA, the genetic code. We can increase the resistance of plants against environmental stress. We are able to understand, modify or inhibit enzymes involved in fundamental processes of life and important signaling mechanisms that occur inside our cells, like cancer. After having determined the structure of the ribosome, the largest factory of proteins in our cells, we can understand how antibiotics work and therefore we are able to modify their structure to improve efficiency. We are learning the structure of certain components of the viruses that fight bacteria highly resistant to antibiotics, and are able to unravel the subtle machinery of defense that have been developed by these germs, so that we can fight them with alternative tools to antibiotics.

With these capabilities, Crystallography has become a key discipline in many branches of science, from Geology to Mineralogy and Materials Science, Chemistry, Nanotechnology, Biochemistry, Biology and Biomedicine. In addition, Crystallography has favored and has been enriched through interaction with other disciplines such as Physics, Engineering and Mathematics, becoming one of the most multi- and interdisciplinary science, linking different areas of frontier research.

### Where are the origins of modern Crystallography?

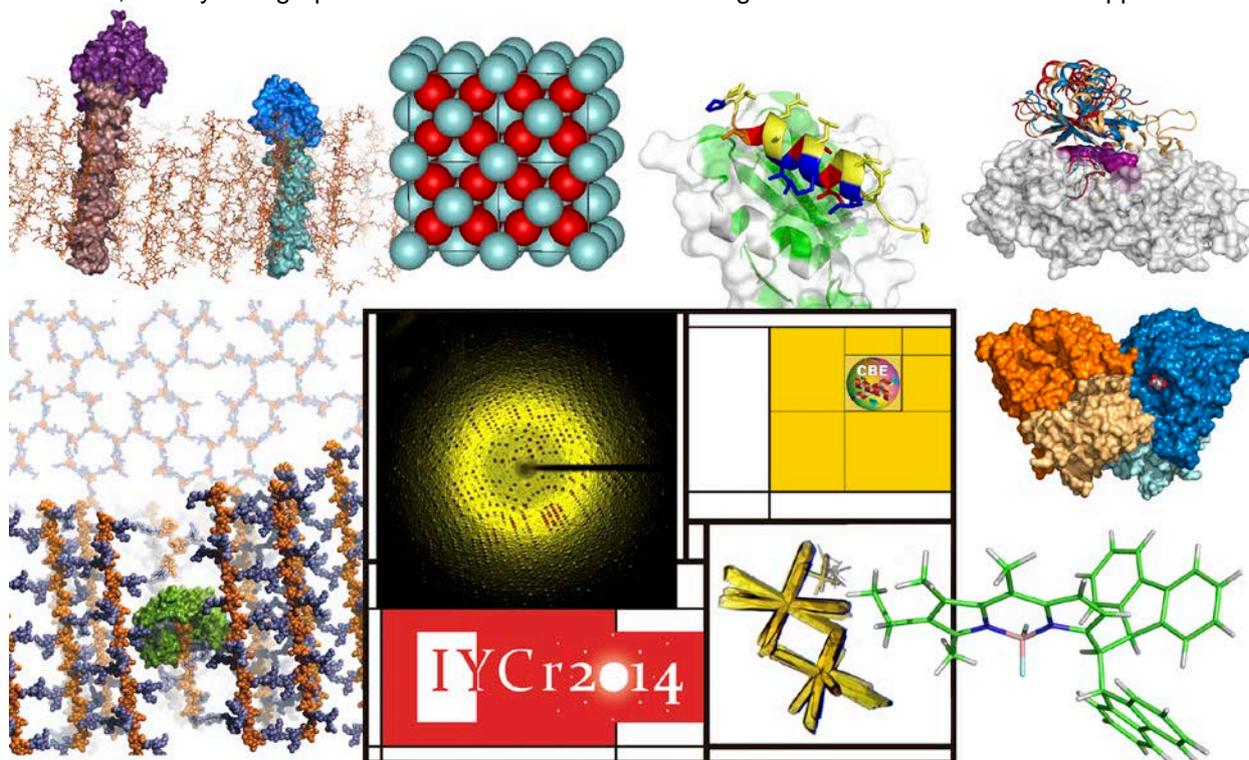
The UN resolution coincides with the centenary of one of the most striking findings of science, the realization that X-rays, discovered in 1895 by Wilhelm Conrad Röntgen (1845-1923), behaved as electromagnetic waves and, what was even more important, that they interact with crystals through the phenomenon called diffraction, demonstrating the well-ordered constitution of these type of matter. Such discoveries (1912), which were due to German physicist and Nobel laureate in 1914, Max von Laue



(1879-1960), were followed by a set of new discoveries that changed our understanding of matter, and therefore the contemporary history.

Many of the scientists who have been responsible for the development of modern Crystallography won the Nobel Prize but, unfortunately, not all who introduced great advances for this science got such official recognition. But even so, Crystallography has produced, directly or indirectly, the largest number of Nobel laureates, 28, during the history of these worldwide awards. Many of these scientists have left a permanent mark on the history of Crystallography. Some of them unfortunately already passed away, but luckily others are still among us, and many others will arrive to keep alive this "unfinished melody" played by the science that every day presents higher challenges.

The crystallographers working in the Institute of Physical Chemistry "Rocasolano", IQFR, (CSIC), warmly known as "Rockefeller", express their special gratitude for the UN resolution, as the history of this Institute is directly related to the creation of one of the first schools of modern Crystallography in Spain, headed by Blas Cabrera (1878-1945), who later became director of the "Rockefeller" and Julio Palacios (1891-1970), among others. The first crystallographic communications of these authors came from the "Rockefeller" in the early 1920s, and the first international crystallographic contribution was written in the same Institute by Julio Garrido (1911-1982) and published in 1948 as the first article of the first volume of Acta Crystallographica (the Journal of the International Union of Crystallography). Crossing over more than a thousand crystallographic contributions on small and medium sized molecules, solved from that early years, and with more than 200 contributions on biological structures (proteins, enzymes and viruses), published since the early 1990's by the current Department of Crystallography and Structural Biology of the IQFR, the crystallographers of this Institute<sup>[1]</sup> extend their gratitude to the CSIC for the support.



[1] The interested readers on these issues can have a look on the information given in the web site: <http://bit.ly/cantVe>, offered by the Department of Crystallography and Structural Biology (CBE, <http://bit.ly/tyleTG>) of the Institute of Physical Chemistry "Rocasolano" (CSIC).