

Conference Call

devoted to the memory of the late Professor Giulio Natta, Nobel Laureate, who discovered method of stereospecific polymerization of olefins (originally propylene), leading to the total production in 2013 of ~70Mt/year of polypropylene, out of ~280Mt/year of total polymer production.

Anyone who has organized a large symposium knows what it means to decide whether contributions should be presented as a lecture or as a poster (over 1000!), and then to decide at which of the seven symposia the paper should be presented. This is an enormous amount of work and congratulations are due to Professor Galli and his coworkers for this invaluable endeavor.

The European Polymer Congress, PISA 2013, was a wonderful and memorable event. The Congress photo gallery available at www.epf2013.org can attest to that.

Research and Education in the Middle East

by Iona Black, Morton Z. Hoffman, and Zafra Margolin Lerman

(See intro on page 6)

The sixth biennial conference, Malta VI, was held 10-15 November 2013, on Malta and while celebrating the tenth anniversary of this series, attracted a total of 85 invited participants, including students and early-career scientists, from 15 Middle East countries (Bahrain, Egypt, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Libya, Palestinian Authority, Qatar, Saudi Arabia, Syria, Turkey, and the United Arab Emirates). Unfortunately, 15 other invitees were unable to come to Malta, which is a member of the European Union, because of visa problems. Following the format of the earlier Conferences, Malta VI featured plenary lectures by the Nobel laureates, workshops on topics of importance to scientists and science educators from the region, oral and poster presentations by participants from the Middle East, and ample time for everyone to make personal and professional connections.

The following Nobel laureates spoke at Malta VI: Yuan T. Lee (Taiwan; Chemistry, 1986), *Return to Nature, Back to Sunshine*; Ada Yonath (Israel; Chemistry, 2009), *Mid-East Regional Collaborations for Investigating Cellular Molecular Machines*; Danny Shechtman (Israel; Chemistry, 2011), *Quasi-Periodic Materials - A Paradigm Shift in Crystallography*; Claude Cohen-Tannoudji (France; Physics, 1997), *Atoms and Light*; Roald Hoffmann (U.S.; Chemistry, 1981), *Protochemistries Are the Bridge*.

Presentations were also made by Yvonne Pope (Chemical Abstracts Services, U.K.), *SciFinder—The Choice for Chemistry Research*; Monique Beaudoin (U.S. Office of Naval Research Global, London), *ONRG's International Research Grants and Research Support Grants*; and Mustafa Al-Ammar (Earth Ambassador for the Protection of the Planet and Preservation of Peace), *Sustainable Peace and Youth Leadership*, who also performed a number of Arabic songs and ballads.

After the conference was opened by Zafra Lerman, MCF President, greetings were offered by His Excellency, Dr. George Abela, President of the Republic of Malta; The Honorable Gina Abercrombie-Winstanley, US Ambassador to Malta; His Excellency, Rob Luke, UK High Commissioner to Malta; Marinda Wu, President of the American Chemical Society; and Henry Frendo, President of the Malta National Commission for UNESCO, who read a message from the Director General of UNESCO, Irina Bokova. A member of the Jordanian delegation read the opening address on "Science for Peace" by HRH Princess Sumaya Bint El Hassan, President, Royal Scientific Society of Jordan, who was unable to attend because of illness. Evening receptions were held during the week at the residences of Ambassador Abercrombie-Winstanley and High Commissioner Luke.

The workshops, which were organized and chaired by participants from the Middle East, Europe, and North America, examined scientific, educational, and regional issues during concurrent sessions: Chemistry and Bio-Medicinal Chemistry; Analytical, Nanotechnology, and Material Science; Energy, Environment, Air and Water Quality; Chemistry Safety and Security; and Science Education at All Levels. A total of 44 oral presentations were made in the workshops; 25 posters were on display throughout the entire meeting.

Chemistry and Bio-Medicinal Chemistry

A wide range of topics were explored in this workshop, including cancer therapy, tumor markers, HIV activity, and myocardial infarction, as well as chemical synthesis and computational studies. Of great interest was a presentation on clinical trials on the analysis of breath samples for the early detection of lung cancer in which chemical nanoarrays and GC-MS are used for the comparison of the signatures and compositions of the exhaled volatile organic compounds that are created as a result of the biological pathways that occur in the human body. The results show a clear distinction among 1) head and neck cancer patients and healthy controls, 2) lung cancer patients and healthy controls, and 3) head and neck cancer patients and those with

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The distinguished guests: (l-r) Marinda Wu (ACS President), Rob Luke (British High Commissioner to Malta), Zafra Lerman (President, Malta Conferences Foundation), George Abela (President, The Republic of Malta), Gina Abercrombie-Winstanley (U.S. Ambassador to Malta), Henry Frendo (President, Malta National Commission for UNESCO).

lung cancer. Other clinical trials aimed to explore the difference in the breath print of the four most widespread cancers in the developed world (lung, prostate, colorectal, breast), which account for half of the cancer deaths; the results showed that each cancer has a unique pattern of volatile organic compounds when compared with healthy patients.

Analytical, Nanotechnology, and Material Science

The current trends in these areas that were described included the atmospheric measurement of pesticides, the extraction, separation, and analysis of lignans, and electron transfer in biological systems. The realm of complex functional bio-composites has attracted a good deal of interest, in particular plant cystoliths, which are mineralized objects formed by specialized cells in the leaves of certain plants, that scatter incident light. Cystoliths are regularly distributed in the epidermis of leaves and protrude into the photosynthetic tissue such that the photosynthetic pigments generate a steep light gradient in the leaf. Under most illumination regimes, the outer leaf layer is light saturated, rendering the photosynthetic apparatus kinetically unable to use the excess light for photochemistry.

Energy, Environment, Air and Water Quality

This workshop had many interlocking components. (see feature on page 5) Inasmuch as collaborations that involve renewable energy among several Middle East countries are currently ongoing, this aspect of the workshop concentrated on current research activities; the hope was expressed that new collaborations could be established to lead to the further development of sustainable resources that do not adversely impact the environment, particularly air quality. With regard to water, the shared resources are under heavy natural and human pressures in terms of quantity and quality, which affect every aspect of life, from ecosystems

and the environment, to food security and health. Because of population growth and urbanization, and despite a general improved standard of living in the region, many communities still lack access to safe drinking water and basic sanitation. The problem of water scarcity provides important opportunities for cooperation and conflict prevention, and could be at the core of programs to promote peaceful coexistence and collaboration among people in Israel, the Palestinian Authority, and Jordan, to the mutual benefit of all the stakeholders.

Chemistry Safety and Security

The awarding of the 2013 Nobel Peace Prize to the Organization for the Prohibition of Chemical Weapons (OPCW) placed in clear focus the work of that group in the development of the international Chemical Weapons Convention (CWC) and the removal of chemical weapons from current areas of conflict in the Middle East. Especially relevant is the fact that some of the participants at Malta VI were from the several countries that have not ratified or signed the CWC. It was pointed out that OPCW is working toward the creation of an international code of conduct for chemists, especially in connection with the problems created by the dual use of chemicals for both peaceful and terrorist purposes.

Science Education at All Levels

In addition to the presentations on innovative pedagogy, systemic assessment, and the use of technology, there were several that attracted particular interest. The talk on the ethics of scientific research emphasized the importance of stressing the basic values of honesty, reliability, and objectivity in all of science education. A representative from Saudi Arabia described the enormous progress made by women scientists in the Arab world, with a particular focus on her own country where there has been a significant increase in the number of highly qualified women scientists, although career opportunities remain limited. A speaker from Egypt reminded the audience that the use of gas weapons in North Africa and the Middle East against civilians engaged in peaceful political protests puts an ugly face on the public perception of chemistry.

At the end of the conference, the workshop organizers provided summaries of the talks in their sessions, many of which were quite provocative and stimulating, and the vigorous discussions that ensued. Proposals were presented for future actions, including the continuation of existing collaborations and

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the development of new ones, the dissemination of the information from the workshops to a broader audience, and the search for funding to provide research and international exchange opportunities for students and faculty.

In the closing session, the participants, many of whom had attended previous Malta Conferences, enthusiastically supported the prospect of holding Malta VII in 2015. They were also invited to provide an evaluation of the conference. Of the many comments that were received, one stands out as the summary of everything that the Malta Conferences embody: "We have only one nationality here—and that's science."

The following organizations were co-sponsors of Malta VI: OPCW, Google, Inc., UNESCO, the Committee of Concerned Scientists, the American Chemical Society, the American Physical Society, and the American Association for the Advancement of Science. More information about the MCF and the Malta Conferences can be found at www.MaltaConferencesFoundation.org.

Iona Black, Morton Z. Hoffman, and Zafra Margolin Lerman are the Secretary, Treasurer, and President of the Malta Conferences Foundation, respectively.



Quadruple Celebration

The International Year of Crystallography (2014) is providing a fantastic opportunity to draw attention to the lives and works of many luminaries in the history and development of X-ray crystallography. To begin with, it commemorates the centennial of the Nobel Prize in Physics that the German physicist Max von Laue (1879-1960) received for his discovery of the diffraction of X-rays by crystals. It also celebrates the 100th birthday of Max Perutz, the Austrian-born British biochemist (1914-2002) who shared the 1962 Nobel Prize in Chemistry with John Kendrew for their studies of the structures of hemoglobin and other globular proteins. It also marks half a century since the Nobel Prize in Chemistry was awarded to the British chemist Dorothy Hodgkin (1910-1994) for her pioneering work on the X-ray structures of many important biomolecules, including cholesterol, penicillin, and vitamin B-12. Likewise, 2014 is the 50th anniversary of the seminal *Science* paper in which F.A. Cotton and coworkers at MIT recognized the presence of a quadruple bond between the rhenium atoms in the $[\text{Re}_2\text{Cl}_8]^{2-}$ ion, an insightful piece of work in which X-ray crystallography played a key role. Although a different salt of this complex ion had been obtained and its crystal structure reported by Russian scientists the year before, no light was shed on their article to rationalize the unusually short rhenium-rhenium distance observed (2.22 Å).



The Soviet stamp illustrated in this note was issued in 1968 to commemorate the golden jubilee of the N.S. Kurnakov Institute of General and Inorganic Chemistry in Moscow. The design of the stamp features a view of the Institute's building in the background (no, it's not a punched card...) and a representation of the crystal structure of $[\text{Re}_2\text{Cl}_8]^{2-}$ with the correct eclipsed conformation for the eight chloro ligands. It is remarkable that such an esoteric molecule (with due respect to Kuznetsov and Koz'min) was pictured on a stamp only five years after it was first described in the open literature. Perhaps that was merely a sign of things to come: by the time the third edition of Cotton, Murillo & Walton's *Multiple Bonds Between Metal Atoms* came out in 2005, more than 1500 different compounds containing quadruple bonds had been made! Furthermore, starting in 2005, a number of chromium complexes showing putative quintuple bonds (or "fivefold bonding interactions" according to the most cautious researchers) have been isolated and have naturally garnered a lot of attention from computational and synthetic chemists alike. The race for sextuple bonds is definitely on!

For a personal account of the discovery of quadruple bonds, see: Cotton, F.A. *J. Chem. Educ.* 1983, **60**, 713-720.

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