

IUMRS

THE INTERNATIONAL UNION OF
MATERIALS RESEARCH SOCIETIES

Serving the Global Materials
Research Community



In the early part of the 20th century, university campuses had departments of metallurgy and perhaps of ceramics in engineering schools. Schools of science had departments of chemistry and physics. Soon polymers had to find their own home. In the post-WWII era, rather than create new polymer science departments, the concept of materials science as a new interdisciplinary field in its own right, one that considered all substances of engineering importance from a unified point of view, arose. Northwestern University in the U.S. instituted the first materials science department in 1955.

In 1960, the U.S. government's Advanced Research Projects Agency encouraged the establishment of interdisciplinary laboratories on university campuses dedicated to materials research and to educating students on how to conduct materials research.

Responding to this trend, researchers at Penn State University in 1970, led by Prof. Rustum Roy, conceived the notion of the Materials Research Society (MRS) which held its first meeting in 1973. MRS meetings are subdivided into symposia on a large variety of topics rather than the more focused meetings typically sponsored by single discipline societies. MRS was instrumental in creating an identity and cohesion for this young field. The fundamentally interdisciplinary nature of MRS meetings, which is well-matched to the way research on advanced materials is actually practiced, has had a strong influence on the direction of all science. Today, the field has expanded to include aspects of geology, mineralogy, and the so-called soft materials of biology.

The MRS formula spread with the founding of the European Materials Research Society (E-MRS) in 1983, followed by analogous organizations in Asia and South America. In every case, the defining criterion was the successful interdisciplinary meetings. In parallel with the professional societies, prestigious international research journals were founded to support the burgeoning yield of discoveries and applications.

In 1991, the several MRS-style societies joined in the formation of the International Union of Materials Research Societies (IUMRS). Founding members of IUMRS were MRS-style societies headquartered in the:

- United States
- Europe
- China
- Mexico
- Taiwan
- Japan
- India
- Australia

The new Union grew until today it supports the MS&E community through several conferences, educational and young researcher forums, award programs, a journal, and participation in joint programs and events sponsored by the United Nations and the International Science Council (ICSU). The Union now has fourteen formal Adhering Bodies with new applicants under consideration.



AFRICA



AUSTRALIA



BRAZIL



INDIA



JAPAN



KOREA



MEXICO



RUSSIA



SINGAPORE



TAIWAN



THAILAND



EUROPE



CHINA



INDONESIA

STRUCTURE OF THE UNION

The Statutes and Bylaws of the Union together define its purpose and governance. A General Assembly composed of representatives of all Adhering Bodies (member societies) is the highest governing authority. It elects officers, approves memberships, and oversees the finances of the organization.

An Executive Council composed of the elected officers of the Union implements programs approved by the General Assembly and sees to day-to-day operations between meetings of the Assembly. It is assisted by a senior executive at its Head Office.

Commissions of the Executive Council are responsible for specific activity areas. Currently, there are commissions empanelled on Awards, Development, Meetings, Member Affairs, and Publications. All activities are focused on one or more of the Union's objectives as articulated in the Statutes.

- To facilitate international cooperation among materials research organizations.
- To contribute to the advancement of materials research in all its aspects.
- To advance the multidisciplinary nature of materials research internationally.
- To promote information exchange among national or regional societies with interests in interdisciplinary materials research, and to work to coordinate their activities.
- To promote communication of international materials research activities through appropriate media.
- To publish international communications and reviews.
- To coordinate, develop, promote and encourage distinguished international conferences, workshops and outreach activities, in collaboration with IUMRS members worldwide.
- To promote materials science education worldwide.

INTERNATIONAL AFFILIATION



IUMRS is an active Full Union Member of ICSU and seeks to collaborate in related constructive international outreach projects and initiatives managed by its Regional Offices, in particular, the Africa Regional Office. IUMRS served as organizer of a session of the Rio+20 Climate conference on roadmapping for sustainable energy policy. IUMRS hosted an ICSU External Review Committee process in 2015 and is a supporting partner in ICSU-funded LAAMP Project (led by IUPAP and IUCr). IUMRS now looks forward to extending the scope of interdisciplinary collaboration and education, as we meet the members of the International Social Sciences Council which is now merging with ICSU to become the International Science Council (ISC).

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EDUCATION

One major objective of the materials research societies has been to foster the rapid and creative development of up-to-date multidisciplinary materials education in schools, universities and vocational colleges where new integrated curricula and modern resources are required by both students and teachers. In our fast evolving high-tech environment, scientists, engineers and administrators also need constant technical updating.

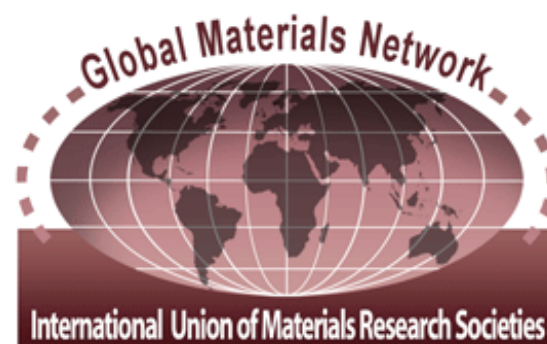
A key audience for interdisciplinary science education must be the broad non-technical population whose exposure to basic scientific concepts and critical thinking will ultimately determine public stewardship of sustainable global assets. Outreach programs are therefore an important component of member programs.

EXAMPLES OF THE IUMRS FOCUS ON EDUCATION

- Symposium/Tutorials: “Materials Education. Polishing Teaching Skills. New Resources and Curricula. Teaching Styles” (Sydney, 2008)
- Forum: “Global Issues for Education” (Rio de Janeiro, 2009)
- Forum & Workshop: “Materials Education Strategies for a Rapidly Changing World” Teaching styles; Science Education and Policy (Yokohama, 2012)
- Forum: “Road Map for the Future Earth” (Fukuoka, 2014)
- Symposium: “Technology-Enabled Education in Sciences; MOOCs” (Singapore, 2015) [MOOCs are Massive Open Online Courses]

GLOBAL MATERIALS NETWORK

The Global Materials Network (GMN) of Early-Career Researchers was launched by IUMRS in 2012 to provide a platform for young researchers from around the world to communicate and collaborate in materials research and education. This interactive and dynamic network of topical nodes operates in both cyber and real space, to accelerate the pace of finding effective global solutions for the future. New members are always welcome. (See <https://globalmaterialsnetwork.org>)



While opportunities for face-to-face, real space interactions are available through meetings and workshops, the GMN website serves as a virtual space to enable continuous connections and ongoing dialogues for materials scientists and engineers and to stimulate communication and collaboration.

The Global Materials Network will evolve to be a dynamic website serving many users from academic, industry, government, and non-profit sectors.

EXAMPLES OF BILATERAL EDUCATION PROGRAMS INVOLVING ONE OR MORE IUMRS ADHERING BODIES



International Summer Schools on Materials for Energy and Sustainability

(Co-sponsors include E-MRS and MRS)

Erice, Sicily, Italy, 2010, 2012, 2014, 2016

Boulder, Colorado, USA, 2015

Pasadena, California, USA, 2017



SciBridge

(MRS and MRS-Africa are both sponsors and participants in this effort.)

SciBridge was motivated by the desire to grow the scientific discussion between U.S. and east African scientists around exciting scientific topics in sustainable energy development. Discussions are facilitated by African university students who perform one- or two-day experiments that are followed by web seminars from U.S. researchers. SciBridge ships kits that contain almost everything needed to perform novel experiments on the theme of materials for sustainable energy.

The SciBridge project is based at North Carolina State University and Makerere University in Kampala, Uganda. Multiple universities in the U.S. and Africa collaborate in order to develop as many research connections as possible.

SciBridge developed as a result of the 1st Joint U.S.-Africa Materials Initiative (JUAMI) Materials Research School in Addis Ababa, Africa, in December 2012. JUAMI, a U.S. National Science Foundation-funded initiative, brought together early career scientists from the U.S. and the east African countries of Ethiopia, Kenya, Tanzania, and Uganda to learn together about the critical topic of materials for sustainable energy.



JUAMI

(MRS and MRS-Africa are both sponsors and participants in this effort.)

The first JUAMI school was held in Addis Ababa, Ethiopia, from December 9 - 21, 2012, on the topic of materials for sustainable energy. The 2013 JUAMI Symposium was part of the MRS-Africa meeting.

Born in 2012 as the "Joint-US Africa Materials Institute," JUAMI aims to build materials science research and collaborations between the Africa and the United States as well as others. Recognition of the broadened audience is reflected in the revised name, "Joint Undertaking for an African Materials Institute." Ties are created between young materials researchers from different parts of the globe through a series of international schools and workshops taught by leading materials scientists and engineers. JUAMI features tutorials on cutting-edge energy materials topics, hands-on experiments and learning activities, and research seminars by top materials scientists.



IMPACT (An MRS Program)

The Impact of Materials on Society course provides a model for building broader bridges between research in engineering, the humanities and social sciences to create successful technologies that address critical social issues in ways that respect human values and belief systems. This course examines the adoption of a wide range of materials in different societies historically and around the globe, and discusses the intended and unintended consequences of the relationships humans make with their material surroundings.



IUMRS CONFERENCES

Two major international conferences actually originated in 1988 prior to Union's formation and were significant factors favouring of the creation of IUMRS: the

- IUMRS International Conference On Advanced Materials (ICAM) and the
- IUMRS International Conference On Electronic Materials (ICEM).

Held in alternate years at the location of the hosting MRS-society, they have proven to be valuable, well-attended events, often serving local researchers and students who are less able to participate in more distant meetings.

The IUMRS International Conference In Asia (ICA) was launched in 1993 and since 2008 has become an annual event for the Asia-Pacific region.

Targeting young next-generation researchers, the biannual IUMRS International Conference Of Young Researchers On Advanced Materials (ICYRAM) began in 2012 and has so far been held in Singapore, Haikou, and Bangalore. It will take place in Adelaide in 2018. We must especially reach out to the rising generation of young scientists, who will soon constitute a major engine of enlightened and inspired global policies and technical progress in many vital areas.

The ICYRAM meetings are an explicit, self-contained example of the dedication of IUMRS to insuring we have a vibrant cadre of materials researchers into the future.

In addition to IUMRS meetings, member societies run their own local meetings, and there are often joint bilateral meetings, e.g., MRS/Mexico, MRS/Australia, MRS/Singapore, and MRS/E-MRS.

FORTHCOMING AND RECENT IUMRS INTERNATIONAL CONFERENCES INCLUDE

- **IUMRS-ICEM**
August 19-24, 2018, Daejeon, Korea. Hosted by MRS-Korea.
- **IUMRS-ICA**
Sept-Oct. 2018 (TBD), Yogyakarta, Indonesia. Hosted by MRS-Indonesia.
- **IUMRS-ICYRAM**
November 4-8, 2018, Adelaide, Australia. Hosted by MRS-Australia. Theme: "Translating Science into Commercial Reality"
- **IUMRS-ICAM**
November 5-9, 2017, Kyoto, Japan. Hosted by MRS-Japan.
- **IUMRS-ICA**
November 5-9, 2017, Taipei, Taiwan. Hosted by MRS-Taiwan.

Most materials research societies also conduct annual multi-topic conferences with international participation in their home locations.



WORLD MATERIALS SUMMITS

The aim of the Summit series is to bring together industry, university, and government representatives to discuss global issues and solutions, and in particular, how materials research and engineering can contribute to addressing global challenges.

- I. **Lisbon, Portugal 2007, 4-5 October**
(Held under the auspices of the Portuguese European Presidency) International Cooperation in Materials Research Key to Meeting Energy Needs and Addressing Climate Change
- II. **Suzhou, China 2009, 12-15 October**
Create international cooperation to address energy-related materials solutions
- III. **Washington DC, United States 2011, 9-12 October**
Materials Research Enabling Clean Energy and Sustainable Development
- IV. **Strasbourg, France 2013, 12-15 October**
Materials: A Key Enabling Technology for Secure Energy & Sustainable Development
- V. **Rizhao, China 2016, 18-20 October**
Advanced Materials for Sustainable Society Development
- VI. **Strasbourg, France 2017, 20-21 November**
Materials Innovation for the Global Circular Economy and Sustainable Society

Forums integral with the Summits have been dedicated to young next-generation researchers from around the world. They both learn from the experts and deliver reports on their own research work.

At the Sixth World Materials Summit, the Forum for Next-Generation Researchers was held November 18-19, 2017.



IUMRS AWARDS

THE IUMRS SÔMIYA AWARD



The annual Sômiya Award is named in honour of Dr. Shigeyuki Sômiya, Professor Emeritus of the Tokyo Institute of Technology, and later Dean at Teikyo University of Science and Engineering. Professor Sômiya is a winner of the MRS Medal and the Japanese Scientific Academic Award.

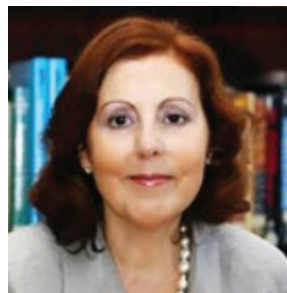
The Sômiya Award honours distinguished research on real materials conducted by a team whose members are drawn from at least two continents.

IUMRS-MRS-S YOUNG RESEARCHER AWARD

The IUMRS-MRS-S Young Researcher Award is given at each ICYRAM conference. Recipients of the award must be under 40 years of age and agree to attend the conference and give a talk. It was awarded at recent meetings in Singapore, Haikou (China) and Bangalore (India). The next one in 2018 will be in Adelaide (Australia). MRS-Singapore is Co-Sponsor of the award.

IUMRS GLOBAL LEADERSHIP AND SERVICE AWARD

Candidates are stakeholders or policymakers who have made significant contributions to the promotion of science, for example, by attracting sponsorship for science. It recognizes leaders in the materials science community who have dedicated their capabilities and talents to serve the greater good and impacts the world-at-large. Next competition is due in 2018.



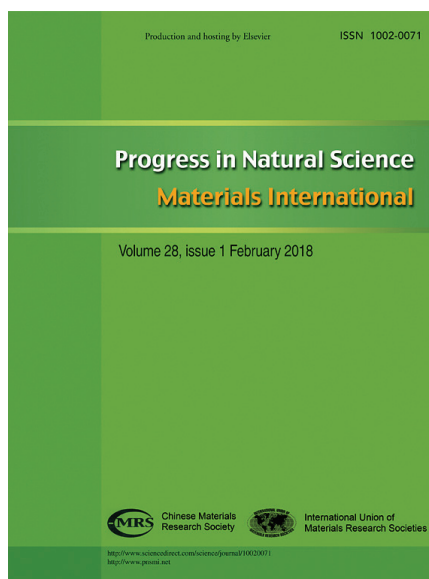
2016 Recipients (left to right)
Sukekatsu Ushioda, Maria da Graça Carvalho and Wan Gang

JOURNAL PUBLICATION

PROGRESS IN NATURAL SCIENCE – MATERIALS INTERNATIONAL

Progress in Natural Science: Materials International is sponsored and organized by both the Chinese Materials Research Society (C-MRS) and the International Union of Materials Research Societies (IUMRS). Its first issue appeared in November, 2010.

Its five-year Impact Factor is 2.598
(2017 Journal Citation Reports, Clarivate Analytics, 2018)



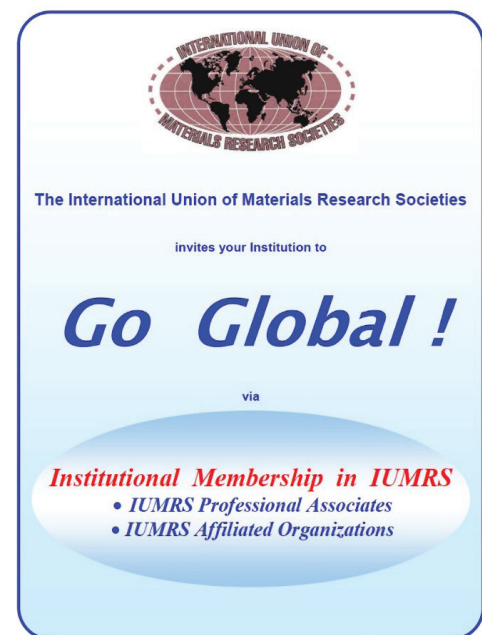
AFFILIATION OPPORTUNITIES BUILT INTO THE IUMRS STATUTES

IUMRS welcomes collaboration or affiliation with qualified institutions, organizations, and agencies whose relevant interest, foresight, expertise and communities also address the IUMRS mission and outreach.

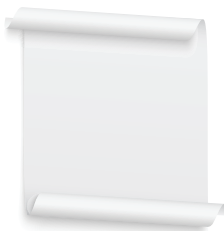
Professional Associate status may be held by institutions that conduct, support or promote materials research, materials education, or related community outreach, including leading universities, academic, government or industrial research centres, and foundations whose mission complements, reinforces, or links with that of IUMRS.

Affiliated Organization status may be held by businesses or corporations having a local, regional, or global presence and wishing to support or participate in the activities of IUMRS or benefit from closer interaction with the materials research community.

Each Professional Associate and Affiliated Organization contributes a fee annually, receives specific membership benefits, and is welcomed as an active participant in IUMRS activities and organization. Associates and Affiliates are urged to contribute fees appropriate to their size and stature in support of IUMRS activities. The minimum annual fee is currently \$500 for Professional Associates and \$250 for Affiliated Organizations (a fixed fraction of the basic annual fee contributed by IUMRS Adhering Bodies).



Materials are so ubiquitous and so important to man's life and welfare that we must obviously delimit the term in this survey, lest we find ourselves investigating nearly every aspect of science and technology and describing virtually every facet of human existence and social life. Unless we limit our scope, all matter in the universe will inadvertently be encompassed within the scope of our survey.



But matter is not the same as material. Mainly we are concerned with materials that are to become part of a device or structure or product made by man. The science part of MSE seeks to discover, analyse and understand the nature of materials, to provide coherent explanations of the origin of the properties that are used, while the engineering aspect takes this basic knowledge and whatever else is necessary (not the least of which is experience) to develop, prepare, and apply materials for specified needs, often the most advanced objectives of the times. It is the necessarily intimate relationship between these disparate activities that to some extent distinguishes MSE from other fields and which makes it so fascinating for its practitioners. The benefits come not only from the production of age-old materials in greater quantities and with less cost—an aspect which has perhaps the most visible influence on the modern world, but it also involves the production of materials with totally new properties. Both of these contributions have changed the economy and social structure, and both have come about in large measure through the application of a mixture of theoretical and empirical science with entrepreneurship. And just as the development of mathematical

principles of design enabled the 19th-century engineer to test available materials and select the best suited for his constructions, so the deeper understanding of the structural basis of materials has given the scientist a viewpoint applicable to all materials, and at every stage from their manufacture to their societal use and ultimate return to earth.

[...] But nowadays the trend in technology is towards ever more complex performance requirements, product and device designs, and dependence on more sophisticated knowledge of the physical phenomena that can be produced in an increasing diversity of materials. The areas of knowledge required to develop, say, an integrated circuit or a biomedical material are not at all coincident with the traditional disciplinary boundaries. It is obvious that many complex technologies call for knowledge and skills that cut across several disciplines, including science and engineering. Thus, we see an increasing need for interdisciplinary approaches in order to achieve technical objectives.

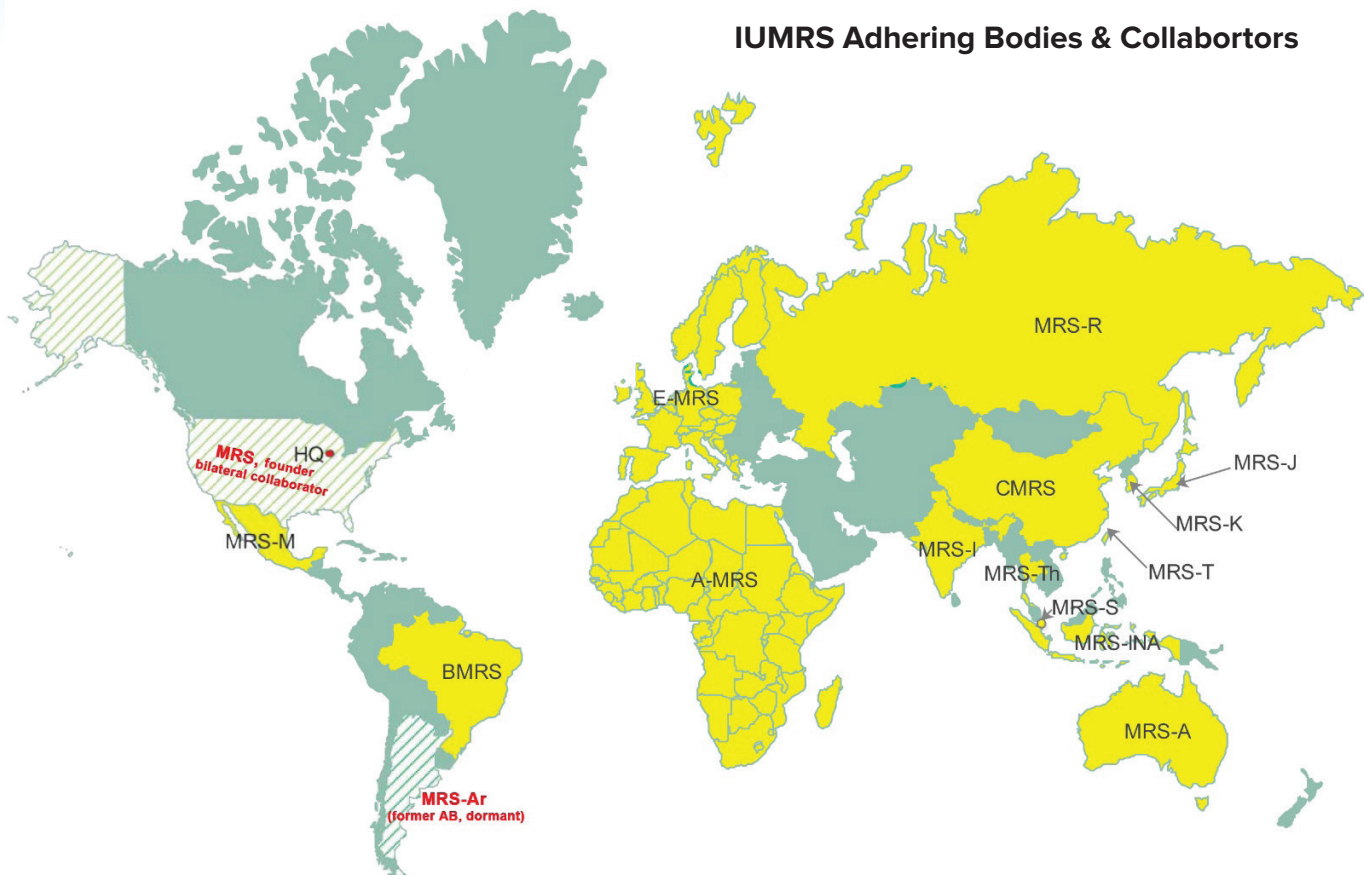
But the interdisciplinary approach is by no means limited to applied research and development programs. The same is happening in basic research in materials. The very core of materials science, the relation of properties to structure and composition, implies a need for the combined efforts of physicists, metallurgists, chemists, etc. In the past, the physicist has too often made unrealistic assumptions about the composition, purity, and quality of his research materials; the metallurgist has too often not understood sufficiently how the physical phenomena exhibited by a solid relate to its structure and composition.

Materials research provides a natural meeting-ground for professionals from the various scientific and engineering disciplines, from basic research to applied research, development and engineering. Clearly, the pressure for such interdisciplinary collaboration can only grow in the future. [Emphasis added]

Excerpted from *Materials and Man's Needs: Materials Science and Engineering* – Volume I, The History, Scope, and Nature of Materials Science and Engineering.(1975) [Supplementary Report of the Committee on the Survey of Materials Science and Engineering] (doi 10.17226/10436).

In near coincidence with the advent of the materials research-style society in the early 1970s, these prescient observations accompanying a survey of the field are as true today as they were at the time. IUMRS programs reflect this unique character and immense utility of the field of materials research. Its member societies foster communication at the leading edge of myriad applications and the underlying fundamental science while pursuing educational goals – educating the students, educating the educators themselves, and educating the public. In this way, IUMRS, its members, and its partners ensure the ongoing health of the field and its continuing contributions to the larger society.

IUMRS Adhering Bodies & Collaborators



WEB SITE & CONTACTS

Visit <https://www.iumrshq.org> for the most current information about IUMRS conferences, awards and other programs. You will also find links to the web sites of IUMRS member societies.

CONTACTS:

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IUMRS Head Office: c/o Prof. RPH Chang, rphchang@gmail.com

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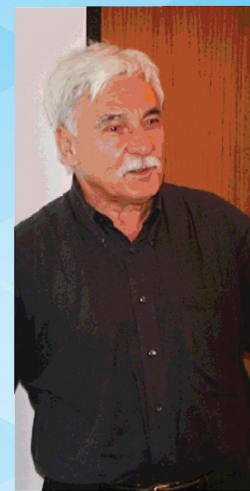
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IUMRS PEOPLE, THE ESSENTIAL INGREDIENT FOR SUCCESS



**- LEADERS -
PAST, PRESENT &
FUTURE**

