Preface

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IUPAC Distinguished Women in Chemistry: Contributions to Science and Careers

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Through the years, there have been countless contributions of women to chemistry. In this International Year of the Periodic Table, it is important to recognize the contributions that women have made in the field. Historically, most notable are the distinct roles that women have played in the development of the Periodic Table – Marie Curie (discovery of radium (Ra) and polonium (Po), received two Nobel Prizes for her work on radiation, and became the namesake of curium (Cm)); Berta Karlik (astatine (At)); Lise Meitner (isotope of protactinium (Pa), discovered nuclear fission, namesake of meinerium (Mt)); Ida Noddack (rhenium (Re), nominated three times for a Nobel Prize); Marguerite Percy (francium (Fr)).

Here, in this special issue of Pure and Applied Chemistry, in celebration of the International Year of the Periodic Table and the 100th anniversary of IUPAC, we recognize a number of the women who received the IUPAC Distinguished Women in Chemistry or Chemical Engineering Award. They have provided short technical reviews for this special issue, or have provided career advice and insight for future scientists and engineers, or have provided examples of how they have navigated the many challenges and opportunities they have encountered in their own careers.

So, how have these women become IUPAC Distinguished Women in Chemistry or Chemical Engineering? To provide context for this special issues, for the International Year of Chemistry in 2011, a project, “Are Women still Underrepresented in Science?” was initiated to celebrate the 100th anniversary of the Nobel Prize in Chemistry awarded to Marie Curie. The project, first sponsored by the American Chemical Society, and initially led by Ingrid Montes and Janet Bryant, included the first international award dedicated to the recognition of distinguished women chemists and chemical engineers across the globe, and acknowledgement and promotion of their work worldwide. Twenty-three women were recognized with the first “IUPAC Distinguished Women in Chemistry or Chemical Engineering”, and the awards were presented at the IUPAC General Assembly and World Chemistry Congress held in San Juan, Puerto Rico, meetings hosted by the Colegio de Quimicos de Puerto Rico and under the leadership IUPAC President Nicole J. Moreau (France). Women were recognized for their distinction and excellence in chemistry and chemical engineering, whether in research, leadership, teaching, management, industry, government, academia, or whatever work sector in which the women are engaged. Among the women honored by the first award were Nobel Laureate Ada Yonath and Princess Chulabhorn (Somdet Phrachao Luk Thoe Chaoafa Chulabhorn Walailak Agrarajakmurai) of Thailand, who has been a remarkable advocate for chemistry.

The celebration and recognition of women in chemistry that was begun in 2011 has continued at each biennial IUPAC General Assembly and World Chemistry Congress since then. In addition to an awards
program that is held at each meeting to present the awards, a symposium is also held to discuss the status of women in chemistry across the globe. Challenges that women can encounter in their careers and routes to navigate challenges have been addressed by the distinguished awardees. The presentations have been motivational, and have been very helpful to women who are newer in the field, to help them understand that everyone faces challenges in their careers, and, that those challenges are not unsurmountable.

To date, four groups of scientists have now been recognized with the IUPAC Distinguished Women in Chemistry or Chemical Engineering Award. On 2 August 2011, in San Juan, Puerto Rico, 23 women were recognized with the very first IUPAC Distinguished Women in Chemistry or Chemical Engineering Award. The awardees were:

- Nouria A. Al-Awadi (Kuwait)
- Ayse Aroguz (Turkey)
- Novella Bridges (USA)
- Joanna Fowler (USA)
- Magdolna Hargittai (Hungary)
- Susan M. Kauzlarich (USA)
- H.R.H. Princess Chulabhorn Mahidol (Thailand)
- Nicole J. Moreau (France)
- Izabela Nowak (Poland)
- Sara Snogerup Linse (Sweden)
- Natalia Tarasova (Russia)
- Lesley J. Yellowlees (UK)
- Faizah Mohammed Abdel Mohsin Al-Kharafi (Kuwait)
- Vanderlan Bolzani (Brazil)
- Luisa De Cola (Germany)
- Véronique Gouverneur (UK)
- Nancy B. Jackson (USA)
- Katharina Kohse-Höinghaus (Germany)
- Linda F. Nazar (Canada)
- Carolyn Ribes (Netherlands)
- Yoshiie Souma (Japan)
- Klára Tóth (Hungary)
- Ada E. Yonath (Israel)

Pictured are a number of the awardees and organizers of the 2011 program, pictured with Susan M. Frontczak, who enacted Marie Curie in a play performed in honor of the International Year of Chemistry.
More details about the 2011 recognition program are provided at the following websites:
http://imageevent.com/pnwalumnaeconnection/wccalbums/iupacworldchemistrycongress2011

In 2013, the awards program was held at the 2013 IUPAC General Assembly and 44th World Chemistry Congress, meetings that occurred under the leadership of IUPAC President Kazuyuki Tatsumi (Japan) and the organization of the Turkish Chemical Society. The awards program was held in a garden ceremony at the Istanbul Lutfi Kirdar Convention and Exhibition Center. The continuation of the recognition program beyond the International Year of Chemistry was supported by both IUPAC (https://iupac.org/project/2013-002-2-022) and ICSU (renamed in 2018 as ISC, the International Science Council).

Pictured above are recipients of the IUPAC 2013 Distinguished Women in Chemistry or Chemical Engineering Award. From left to right, Yi Xie, Kazue Kurihara, Mary Garson, Liliana Mammino, Elsa Reichmanis, Concepcio Rovira, Angela Wilson, Evamarie Hey-Hawkins. Additionally in the picture on the right are Gulcin Erem Berkel, The Dow Chemical Company, sponsor of the presentation, and Professor Nicole Moreau, former IUPAC President.

The 2013 honorees were:

Irina P. Beletskaya (Russia)  Annette Doherty (UK)
Mary Garson (Australia)      Evamarie Hey-Hawkins (Germany)
Kazue Kurihara (Japan)      Liliana Mammino (South Africa)
Elsa Reichmanis (USA)        Concepcio Rovira (Spain)
Maria Vallet-Regi (Spain)    Angela Wilson (USA)
Yi Xie (China)
A symposium was held where the awardees described their careers, support, and challenges they encountered, and shared advice and recommendation for younger scientists. An additional discussion was held about the status of women in chemistry across the globe.

For the 2015 IUPAC project, https://iupac.org/project/2015-0071-020, and recognition program, the award ceremony took place during the IUPAC 48th General Assembly and 45th World Chemistry Congress at the Busan Exhibition and Conference Center (Bexco) in Busan, Korea, which was hosted by the Korean Chemical Society and under the leadership of IUPAC President Mark Cesa (USA).

The awardees of the IUPAC 2015 Distinguished Women in Chemistry or Chemical Engineering recognition are as follows:

Lucia Banci (Italy) Margaret Brimble (New Zealand)
Ewa Bulska (Poland) Karen Gleason (USA)
Janet Hering (Switzerland) Nadia G. Kandile (Egypt)
Maki Kawai (Japan) Hyunjoo Lee (South Korea)
Carmen Najera (Spain) Helga Rübsamen-Schaeff (Germany)
Robert Sessoli (Italy) Livia Simon Sarkadi (Hungary)

The ceremony coincided with a symposium entitled “Women in Chemistry: Gaining Momentum” and a reception, which were both held in honor of the recipients. At the symposium, award recipients shared their stories, describing their personal career highlights, and provided their insight about how women can best achieve success in chemistry.
was held, and the awardees participated in a panel discussion about their career pathways, challenges they encountered, and advice to younger chemists.

The 2017 Distinguished Women in Chemistry recognized in São Paulo (L to R): Vanderlan Bolzani (Women in Chemistry Special Symposium coordinator), Ingrid Montes, Misako Aida, Veronika Meyer, Yvonne Mascarenhas, Angela Wilson (Symposium co-chair), Zafra Lerman, Frances Separovic, Carolyn Ribes (Symposium co-chair), Concepción Gimeno, Thisbe Lindhorst, Lifeng Chi, and on the far right, IUPAC President Natalia Tarasova. The gentleman in the back row is IUPAC Secretary General Richard Hartshorn. For background information about these awards, see iupac.org/iupac-2017-distinguished-women.

The 2017 awardees were:

Misako Aida (Japan)
M. Concepción Gimeno (Spain)
Zafra Lerman (USA)
Ekaterina Lokteva (Russia)
Veronika Ruth Meyer (Switzerland)
Frances Separovic (Australia)

Lifeng Chi (China)
Jaqueline Kiplinger (USA)
Thisbe K. Lindhorst (Germany)
Yvonne Mascarenhas (Brazil)
Ingrid Montes-González (Puerto Rico)
Jihon Yu (China)

The program will continue to recognize outstanding women, and we look forward to recognizing them and including them among this distinguished group of women scientists.

We hope that you enjoy the manuscripts in this special issue as much as we have and find them insightful.

And, finally, we recognize several individuals. The initial and ongoing support of this IUPAC awards program would not have been possible without the support of the IUPAC Presidents through the years.
We recognize the following former and current IUPAC Presidents: Nicole Moreau, Kazuyuki Tatsumi, Mark Cesa, Natalia Tarasova, and Qi-Feng Zhou. And, for this special issue, we especially thank Hugh Burrows, Editor of *Pure and Applied Chemistry*, not only for his willingness to enable this special issue, but also the significant work that he has put into this issue. This issue would not have been possible without him.

**Article note:** A special collection of invited papers by recipients of the IUPAC Distinguished Women in Chemistry and Chemical Engineering Awards.