

Science: A Truth Worth Defending

by Paul T. Anastas, Yale University, USA

Science and scientific institutions face growing skepticism said Paul T. Anastas in his plenary talk. He called for a critical and honest reflection: Why does science now need defending?

Citing Einstein's assertion that "the right to search for the truth implies also a duty," Anastas argues that ethical conduct and integrity must remain central to science. But the need to preserve and protect science goes beyond defending its credibility—it requires understanding why it is under attack in the first place.

Historically, science emerged from resistance. The Scientific Revolution challenged entrenched beliefs and often faced accusations of heresy. Over centuries, science transformed into a dominant force of knowledge—what some have called a new orthodoxy. But with power comes scrutiny, and Anastas urges us to examine whether modern science's methods, culture, or institutions may themselves contribute to public distrust.

Do individuals or institutions feel threatened by scientific findings? Are political, ideological, or economic forces driving the backlash? Is science too often perceived as elitist, opaque, or disconnected from public concerns?

Anastas does not simply lament the erosion of public trust. Instead, he challenges the scientific community to confront uncomfortable truths about itself. Introspection, he suggests, is essential—not only to restore confidence but to build a science that truly serves society.

By asking hard questions and acknowledging past shortcomings, science can be strengthened—not weakened. The path forward lies not in defensiveness, but in openness, accountability, and a renewed commitment to the values that made science a trusted pursuit in the first place. In doing so, we affirm that science is not just worthy of protection—it is worthy of the public's belief, engagement, and support.

Building Trust in Science: A Two-Way Commitment

by Peter Mahaffy, The King's University, Edmonton, Canada

Restoring trust in science requires more than correcting misinformation—it demands that scientists understand their audiences and that science itself is demonstrably worthy of trust said Peter Mahaffy in his plenary talk. He argues that effective science communication



David Winkler, Peter Mahaffy, and Elizabeth Hall

must move beyond the outdated "deficit model," which assumes public mistrust stems from a lack of knowledge. Instead, scientists must engage with the public's values, perspectives, and lived experiences.

Drawing from his work with IUPAC and other international bodies, Mahaffy emphasizes that science communication should be rooted in mutual understanding. A key reference is the IUPAC Project *Chemists and "The Public"* (2008), [1] which highlights how scientists can better connect with diverse audiences by applying systems thinking and acknowledging context—critical in combating the spread of misinformation.

Equally important is ensuring science remains trustworthy. Mahaffy highlights global initiatives like the International Science Council's *Principle of the Universality of Science*, which balances the freedom to conduct research with the responsibility to uphold ethical standards. This principle was refined to reinforce that scientific freedom must go hand-in-hand with accountability.

Ethical practice in chemistry is central to Mahaffy's message. The *Hague Ethical Guidelines*, developed by chemists worldwide, underscore the importance of safeguarding science from misuse, particularly in light of the Chemical Weapons Convention. Similarly, the IUPAC CEDEI task force has developed *Guiding Principles for the Responsible Practice of Chemistry*, that was formally launched at the 2025 World Chemistry Congress in Malaysia. These principles aim to foster a culture of integrity, transparency, and public engagement.

Mahaffy's vision for building trust in science is clear: scientists must listen as much as they speak, commit to ethical conduct, and embrace responsibility as part of their professional identity. Only then can science

maintain the public's confidence and fulfill its role in advancing the common good.

1. (Mahaffy 2008, *Pure Appl. Chem.*, Vol. 80, No. 1, pp. 161–174, 2008, <https://doi.org/10.1351/pac200880010161>, or <https://iupac.org/project/2004-047-1-050/>)

Science Under Siege: Confronting the Hydra's Many Heads

by David Winkler, La Trobe University, Monash University, University of Nottingham

Science is facing a multifaceted and intensifying assault, likened by Professor David Winkler to a Hydra—each challenge spawning new threats even as others are addressed. While attacks on science are nothing new, today's wave is unprecedented in scale and complexity, fueled by political polarization, digital disruption, and growing public skepticism.

The internet has democratized access to scientific research but also enabled the rise of predatory journals and conferences, diluting the impact of legitimate science. The explosion of AI-generated content—often built on flawed, biased, or insufficient data—has further strained the credibility of scientific outputs. Peer reviewers, overwhelmed by a flood of low-quality submissions, are stretched thin, making it easier for unvetted studies to slip through.

A reproducibility crisis also looms large. A 2016 *Nature* survey found that over 70 % of researchers across disciplines failed to replicate others' results—and more than half failed to reproduce their own. Confirmation bias, underpowered studies, and a rush to publish are compounding the issue. Pre-registration of experiments and new models of continuous online review may help reverse this trend.

Ethical oversight remains uneven. While some organizations like the American Chemical Society and Royal Society of Chemistry enforce formal codes of ethics, many universities still fail to mandate coursework on scientific integrity and bias. Winkler highlights the urgent need for a global chemical ethics framework, especially given the powerful—and potentially dangerous—applications of chemistry and biology.

Finally, anti-science rhetoric, particularly in the U.S., has been amplified by social media influencers and uncredentialed commentators. The erosion of expert voices, visible during the COVID-19 pandemic, underscores the need for renewed advocacy. The path forward may include more grassroots efforts—like the March for Science—and a renewed global commitment

to uphold the integrity, transparency, and public value of scientific inquiry.

<https://iupac.org/event/wclm-2025-trust-in-science-and-the-right-to-science/>

Sustainable Practices for Promoting Diversity in Chemistry

by Siu Yee New and Mei-Hung Chiu

The issue of gender has been highlighted as one of the United Nations' Sustainable Development Goals. To further raise public and policymakers' awareness, the IUPAC World Chemistry Congress 2025, held in Kuala Lumpur, Malaysia, organized an SDG5 (Gender Equality) symposium. The event brought together participants and experts to exchange ideas and share actions aimed at reducing gender disparity, while promoting inclusion, diversity, and equality.

The SDG5 symposium convened a vibrant and diverse group of scientists, educators, and leaders to explore how chemistry can serve as a catalyst for gender equality and inclusive innovation. Titled "*Sustainable Practices for Promoting Diversity in Chemistry*," the session attracted strong participation and featured dynamic, engaging Q&A discussions that encouraged open dialogue and knowledge exchange.

Rethinking Leadership and Redefining Success

Speakers emphasized that advancing gender equality in chemistry demands systemic change—reimagining who leads, who participates, and how success is defined. Josephine Tsang (Chemical Institute of Canada) called for a transformation in scientific culture through inclusive leadership and allyship, urging institutions to amplify underrepresented voices and build equitable frameworks that support resilience in the sciences. Javier García-Martínez (University of Alicante) introduced IUPAC's initiative to establish *Guiding Principles for Responsible Chemistry* [1], grounded in ethics, diversity, and inclusion. He stressed that chemistry must align with societal goals and embed equity across research, education, and public engagement.

Mentorship and Visibility: Building Inclusive Communities

The symposium highlighted the importance of mentorship and visibility in supporting women and