24 January 2025

Governments should expand funding for basic chemical research

Proclamation signed by Presidents of national Chemical Societies

Humanity faces six global challenges known technologies cannot meet: 1. Atmospheric changes, 2. Sustainable energy, 3. Dwindling raw materials, 4. Water scarcity and safety, 5. Food for everybody, 6. Health problems. Because science is unpredictable and information grows exponentially, these global challenges will likely be met by future technologies. Since these challenges are primarily chemical problems, it is our responsibility and opportunity, as chemists, to solve them by using novel technologies, which will come through basic research.

Basic research also fosters a culture of innovation, curiosity, and critical thinking within society, nurturing a skilled workforce of scientists, researchers, and innovators, boosting a country's scientific capabilities and intellectual capital, leading to long-term societal benefits, and promoting international collaboration.

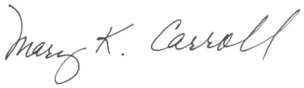
History shows, particularly over the past 100 years, that basic science research resulted, unexpectedly, in numerous disruptive new technologies that led to transforming industries, improving lives, and shaping the modern world. Some noteworthy examples include the development of transistors, which originated from basic research in semiconductor physics. Fundamental physics research led to the MRI medical imaging technology. The groundbreaking CRISPR-Cas9 gene editing technology originated from basic research on bacterial immune systems. The first antibiotic, Penicillin, was accidentally discovered while studying bacteria. Lithium-ion batteries that power portable electronics and electric vehicles stem from materials science and electrochemistry. The Laser Technology emerged from theoretical physics. The discovery of insulin originated from basic research into physiology. The light-emitting diodes (LEDs) emerged from basic research in semiconductor materials and solid-state physics. Other unexpected technologies include the microwave oven, Velcro, Teflon, X-rays, radioactivity, Super Glue, pacemaker, vulcanized rubber, safety glass, synthetic dyes, quinine, saccharin, anesthesia, the Internet, GPS, and many more.

These examples highlight how basic science research forms the foundation for transformative technologies that drive progress, innovation, and economic growth across multiple sectors, enhancing productivity and improving societal well-being. A National Science Foundation (NSF) report indicates that for every dollar spent on basic research, the return can be as high as $8 in terms of economic output, and research institutions produce a highly trained workforce that advances the industry and national economy. A report by Nature magazine claims that basic research is a critical driver of innovation, with approximately 60% of new technologies arising from discoveries made in basic science. Countries that invest heavily in basic research lead in the global innovation and competitiveness rankings and consistently outperform those with lower investment.

Basic research, driven by hypotheses and curiosity and grounded in universal scientific norms, thrives on collaboration. In contrast, applied research, which is goal-oriented, often involves intellectual property considerations and a lower inclination to share results. Accordingly, fostering a collaborative environment across all research disciplines is essential. Frequently, the most significant breakthroughs occur in these collaborative spaces, making the case for shared knowledge and collective effort.

We encourage policymakers, legislators, government officials, and strategic decision-makers to recognize their pivotal role in prioritizing, securing, and increasing funding for basic research in chemistry and other fields of science. Their decisions can shape the future of innovation and economic growth in their countries.

Prof. Ehud Keinan
President, IUPAC



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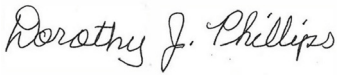

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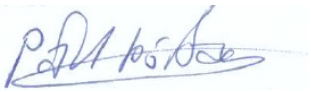

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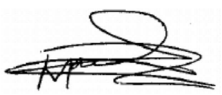

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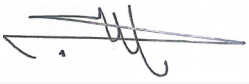

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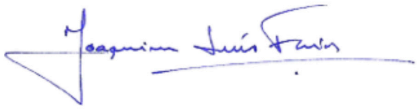

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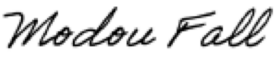

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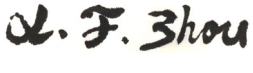

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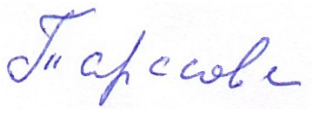

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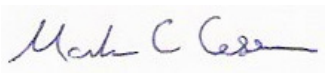

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