

Introducing *RSC Mechanochemistry*Cite this: *RSC Mechanochem.*, 2024, 1, 9 James D. Batteas ^{*a} and Tomislav Friščić ^{*b}

DOI: 10.1039/d4mr90001d

rsc.li/RSCMechanochem

We are so pleased to welcome you to the first issue of *RSC Mechanochemistry*! The creation and launch of this journal is the culmination of years of discussions, consultations, and shared vision of a broad community of researchers across academia and industry, all with the common goal of advancing our fundamental understanding of how mechanical forces can drive chemistry. The excitement about mechanochemistry, and the enthusiasm of the community of mechanochemists, on which this journal builds, is reflected in the long-standing activities of the International Mechanochemistry Association (IMA),¹ as well as by the recent explosion of symposia dedicated to mechanochemistry by the American Chemical Society and the International Union for Pure & Applied Chemistry (IUPAC) – that in 2019 recognized mechanochemistry as one of the top ten technologies that could change the world.² To this is added the growth of leading specialised conferences now being dedicated to mechanochemistry, such as the *Faraday Discussions*,^{3,4} the Gordon Research Conferences,⁵ and the long-standing INCOME,⁶ not to mention the myriad of activities in interconnected

fields, such as tribology and biomechanics. Each have brought together researchers from around the world creating synergy among the different areas in which mechanochemistry plays a central role. These interconnections that have formed over the last decade have led to the establishment of large, collaborative, international initiatives all aimed at advancing and promoting mechanochemistry. These include the EU COST Action on Mechanochemistry for Sustainable Industry,⁷ the Impactive Consortium,⁸ as well as the US National Science Foundation's Centre for the Mechanical Control of Chemistry, that has recently entered a second phase of growth.⁹

What we have learned from all of this is that mechanochemistry is ubiquitous. It touches on so many areas that it had often gone unrecognized. Transformations induced upon input of mechanical energy have been known and used by human civilisation since times immemorial, and some of the earliest known metallurgical procedures seem to be based on mechanochemical reactivity.^{10,11} While the interest of scientists in such transformations has been persistent over the years, with notable mentions of Michael Faraday who was fascinated by mechanically facilitated transformations of metal halides, and by M. Carey Lea, who is often regarded as the father of modern mechanochemistry,¹² the field

has without any exaggeration exploded over the past two decades.

With the rise of efforts to make chemistry more sustainable, the field has surged forward, with mechanochemical synthesis becoming an ever-increasing tool for ensuring the future of our world as we strive to make the best use of our natural resources. As with many fields of science, the advancement of mechanochemistry has gone hand in hand with the development of new technologies that have become accessible to researchers in many different areas, as illustrated by the emergence of increasingly sophisticated methods to follow chemical transformations under applied forces in real time and the evolution of sophisticated methods for envisioning hidden processes through advanced computational methods. Mechanochemistry today covers a vast array of topics, from investigations of single-molecule reactions using atomic force spectroscopy, understanding the processes taking place on surfaces and how they relate to technological or geological contexts such as lubrication or earthquakes, as well as to the creation of new alloys through mechanical alloying, green and environmentally-friendly organic synthesis, reaction discovery based on the grinding, milling or extrusion of reactive materials – and much more.

All of this told us that the time was now right to create a publishing forum that could capture this wide and vibrant

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range of contributions, aimed both at fundamental understanding, as well as at practical applications of mechanochemistry. A place where we could connect the different languages of mechanochemistry, to unite the efforts across the many disciplines it touches. Thus, the mission of *RSC Mechanochemistry* is to provide such a forum, where leading research in mechanochemistry is reviewed by experts in the field, and made accessible to the broader community, in order to advance the field. In pursuing this goal, we perceive *RSC Mechanochemistry* as an important factor for supporting the work of mechanochemists, sintering together the mechanochemistry community, as well as driving and catalysing the further growth of mechanochemistry in all its shapes and forms.

This is in no way a small task, considering the history and breadth of the field, but together with our team of Associate Editors, our Editorial Board and Advisory board, we are pleased to see

that both the contemporary popularity and the wide diversity of mechanochemistry are already clearly visible in the very first issue of *RSC Mechanochemistry*. As we endeavour to bring the best science to you in this journal, we hope that you will join us on this journey and add your contributions to its rich history and future.

References

- 1 <https://imamechanochemical.com/>.
- 2 <https://www.chemistryworld.com/news/iupac-names-10-chemistry-innovations-that-will-change-the-world/3010335.article>.
- 3 T. Friščić, S. L. James, E. V. Boldyreva, C. Bolm, W. Jones, J. Mack, J. W. Steed and K. S. Suslick, *Chem. Commun.*, 2015, **51**, 6248–6256, DOI: [10.1039/C5CC90113H](https://doi.org/10.1039/C5CC90113H).
- 4 *Mechanochemistry: Fundamentals, Applications and Future: Faraday Discussion 241*, Royal Society of Chemistry, 1st edn, 2023, ISBN-13: 978-1839166976, ISBN-10: 1839166975.
- 5 <https://www.grc.org/multiscale-mechanochemistry-and-mechanobiology-conference/>.
- 6 <https://imamechanochemical.com/events/>.
- 7 J. G. Hernández, I. Halasz, D. E. Crawford, M. Krupicka, M. Baláž, V. André, L. Vella-Zarb, A. Niidu, F. García, L. Maini and E. Colacino, *Eur. J. Org. Chem.*, 2020, 8–9.
- 8 <https://mechanochemistry.eu/>.
- 9 <https://www.chem.tamu.edu/cmcc/>.
- 10 M. Marchini, M. Gandolfi, L. Maini and M. Martelli, *Proc. Natl. Acad. Sci. U. S. A.*, 2022, **119**, e2123171119, DOI: [10.1073/pnas.2123171119](https://doi.org/10.1073/pnas.2123171119).
- 11 https://artsandculture.google.com/story/mechanochemistry-the-science-of-crush-science-history-institute/UQUh6_yaa-LjTg?hl=en.
- 12 L. Takacs, *Chem. Soc. Rev.*, 2013, **42**, 7649–7659.

