Mechanochemistry: Beyond the Magic

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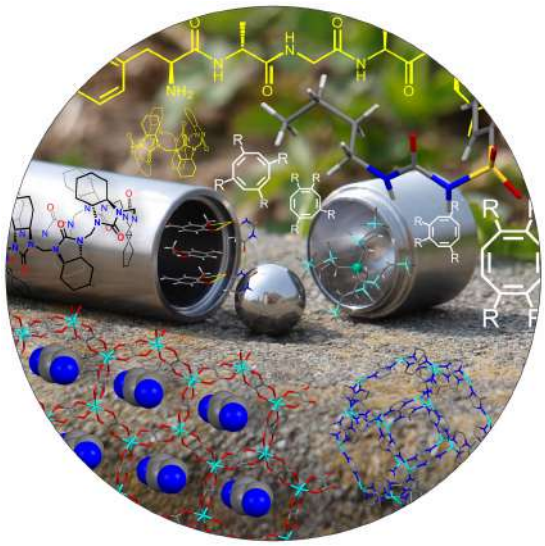

Over the past decade there has been an almost explosive growth of interest in mechanochemistry, a route for the synthesis of materials and molecules through solvent-free milling or shearing.[1] While one important aspect of such interest is the inherently green, solvent-less environment that makes mechanochemistry a uniquely general methodology to circumvent environmentally-taxing problems of solvent toxicity and chemical waste, another one is a growing list of new opportunities offered by mechanochemistry as opposed to conventional, solution-based routes. Some of these new opportunities include expanding the range of products and reactants by offering a simple route to work with poorly soluble and/or thermally-sensitive sustances, as well as access to new chemical reactivity and even molecules or materials that have previously been considered tantalizing, if not impossible, to obtain.[2,3] Due to such new opportunities, and also a poorly developed mechanistic understanding of mechanochemical reactions, mechanochemistry has acquired a reputation of magic and mystery.

This presentation will outline the recent work of our group, and others, in unravelling the mechanistic aspects of mechanochemistry, address details of reaction kinetics and mechanisms revealed by recently emerged but broadly popular methods for real-time and *in situ* reaction monitoring, and interpret them in the wider context of reaction thermodynamics and energetics.[4] At the same time, this will provide an opportunity to highlight exciting applications of mechanochemistry in making new materials, including nanosystems, metal-organic frameworks (MOFs), complex molecular targets, as well as active pharmaceutical ingredients (APIs).[5]

References

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