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Syntheses in ball mills – mechanochemical pathways towards polymer framework and porous carbon materials

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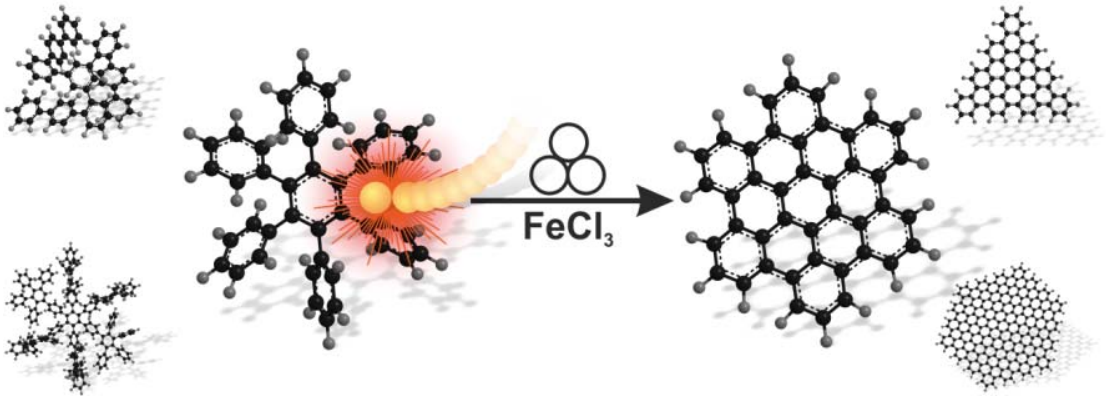
It is a major challenge of our time to develop sustainable chemical processes and to reduce the amount of waste generated by the chemical industry. Particularly solvents, often harmful for the environment, accumulate in many of the chemical processes. Our group develops new synthesis concepts, completely avoiding the use of any solvents. These syntheses are based on mechanochemistry. We utilize mechanical energy, which is brought into the system by ball milling, to initiate chemical reactions, rather than temperature as in conventional thermally-induced reactions. With this, an unconventional chemistry is possible with different reaction mechanism, reaction products, and product selectivities as compared to classical solvent-based syntheses. We are focusing on the mechanochemical synthesis of nanostructured materials such as porous carbons[1], nanographenes[2], polymers[3] and framework materials[4]. We are motivated by the fundamental curiosity how ball-milling, commonly utilized to destroy matter, can be applied to construct fragile and defined framework materials.



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References:
(1) E. Zhang, G.P. Hao, M. E. Casco, V. Bon, S. Grätz, L. Borchardt *J. Mater Chem. A* **2018**. 6, 859-865.
(2) S. Grätz, D. Beyer, V. Tkachova, S. Hellmann, R. Berger, X. Feng, L. Borchardt *Chem. Commun*. **2018**, *54*, 5307-5310.
(3) S. Grätz, B. Wolfrum, L. Borchardt, L. *Green Chemistry* **2017**, 13, 2973-2979
(4) E. Troschke, S. Grätz, T. Lübke, L. Borchardt, *Angew. Chem. Int. Ed.* **2017**,*129*,6963-6967.