Industrial production of novel 2D materials for energy and sensing technology

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We will provide an overview on our scale up methodology devoted to the industrial production of high-quality novel 2D materials.^[1-3] The industrial development of novel 2D materials in various applications requires scalable, reliable, and cheap production processes.^[1-8] This requires a balance between final product quality and ease of fabrication. We will show the efficiency of the manufacturing of high-quality 2D materials by wet-jet milling^[1] and, in particular, the path towards industrial production of 2D hexagonal boron nitride (*h*-BN).

Afterward, we will also provide an overview on key applications of the as-produced high quality 2D materials. We will show how the production of 2D materials in liquid phase by wet-jet milling^[1] represents a key pathway towards the development of 2D materials-based next-generation devices, offering large integration flexibility with respect to other production methodologies^[4-10].

References

- [1] A. E. Del Rio Castillo, et. al., Mater. Horiz. 2018, 5, 890.
- [2] F. Bonaccorso, et al., Materials Today 2012, 15, 564.
- [3] F. Bonaccorso, et. al., Adv. Mater. 20, 1628, 6136.
- [4] M. A. Molina-Garcia, et al., J. Phys. Mater 6 (2023), 035006
- [5] O. Kaya, et al., J. Phys. Mater. 8, (2025), 042002.
- [6] S. Pescetelli et al., Nature Energy 7, (2022), 597-607.
- [7] P. Mariani, et al., Nature Comm. 15, (2024), 4552.
- [8] L. Najafi et al., ACS Nano 12, (2018), 10736.
- [9] F. Bonaccorso, et. al., Science, 347, (2015), 1246501.
- [10] E. Pomerantseva, et al., Science 366, (2019), eaan8285.

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