

## MnPS<sub>3</sub>: Exfoliation and stabilization with different Capping Agents

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Among layered materials, MnPS<sub>3</sub> has attracted the attention of many researchers due to a wide variety of interesting properties (tunable bandgap, magnetic behaviour, and electrocatalytic performance amongst others), making it suitable for applications in several fields (catalysis, optoelectronics, magnetism...).<sup>[1]</sup> These properties can be tuned by separating its layers, therefore, a huge effort has been made to exfoliate bulk MnPS<sub>3</sub> material, trying to obtain thin and good quality two-dimensional (2D) layers in a scalable way.<sup>[2]</sup>

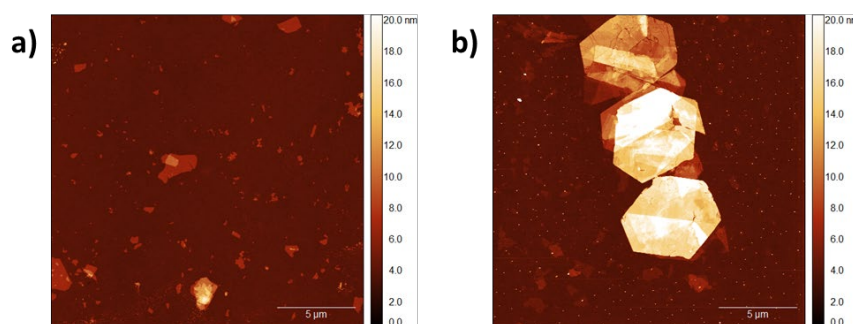
Despite the fact that MnPS<sub>3</sub> has been successfully exfoliated by the well-known scotch-tape method, the obtaining of stable suspensions of high-quality flakes that can be processed as inks remains elusive. So far, it has been possible to obtain stable dispersions of MnPS<sub>3</sub> 2D layers by using polyvinylpyrrolidone (PVP) as a capping agent.<sup>[3]</sup> However, there are no reports of liquid exfoliation methods that provide good-quality naked flakes in solution, preventing the use of this material in several applications which require a free accessibility to MnPS<sub>3</sub> surface. Moreover, the effectiveness of different capping agents that can modulate the stability in different solvents or the chemical tuning of the flakes, has not been explored.

For this reason, in this work, we present our last results about the liquid exfoliation of MnPS<sub>3</sub> as bare high accessible flakes and with different polymers and isolated molecules as capping agents. In this way, depending on the desired final application, it is possible to modulate the surface of the layers at will.

### References

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- [2] R. Gusmão, Z. Sofer, M. Pumera, *Adv. Funct. Mater.*, 28 (2019) 9326-9337
- [3] a) R. F. Frindt, D. Yang, P. Westreich, *J. Mater. Res.* 5 (2004) 1107-1112 b) W. Bai, Z. Hu, C. Xiao, J. Guo, Z. Li, Y. Zou, X. Liu, J. Zhao, W. Tong, W. Yan, Z. Qu, B. Ye, Y. Xie, *J. Am. Chem. Soc.*, 142 (2020) 10849-10855

### Figures



**Figure 1:** a) MnPS<sub>3</sub> flakes with polyvinylpyrrolidone as capping agent b) MnPS<sub>3</sub> flakes without any capping agent