

Effect of polymeric coating on chemically exfoliated MnPS₃

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Among layered materials, MnPS₃ 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...).[1] These properties can be tuned by separating its layers, therefore, a huge effort has been made to exfoliate bulk MnPS₃ material, trying to obtain thin and good quality two-dimensional (2D) layers in a scalable way.[2]

Despite the fact that MnPS₃ has been successfully exfoliated by the well-known scotch-tape method, obtaining 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 MnPS₃ 2D layers by using polyvinylpyrrolidone (PVP) as a capping agent. [3] However, there are no reports of liquid exfoliation methods that provide good-quality bare flakes in solution, preventing the use of this material in several applications which require a free accessibility to MnPS₃ surface. Moreover, the effectiveness of different coating molecules 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 MnPS₃ as bare high accessible flakes and with different polymers and isolated molecules as coating layers. 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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Figures

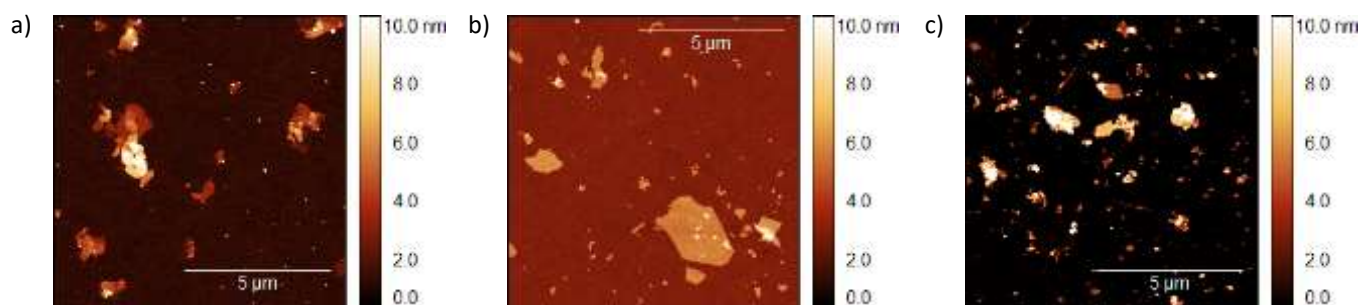


Figure 1: a) Bare MnPS₃ flakes b) MnPS₃ flakes covered with PVP layer c) MnPS₃ flakes covered by polyethyleneimine