When 2D black phosphorus meets transition metal nanoparticles: synthesis, characterization and application

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Recently, a new member of the growing family of 2D materials, named phosphorene, being the P-counterpart of graphene, was successfully isolated by exfoliation of the black allotrope of the element.[1] Single and few-layer black phosphorus (2D bP) have gained lot of interest being semiconductors with high carrier mobility and an in-plane structural anisotropy. Successfull applications in batteries, transistors, sensors and photonics have shown 2D bP as a promising novel nanomaterial, though the problem of ambient stability still hampers its wide use.[1] Currently, we are exploring its functionalization with late transition metal nanoparticles, as Ni and Pd. Preliminary tests have shown the nanohybrid Ni/2D bP has an improved stability in ambient conditions in comparison to pristine 2D bP. This feature prompted us to use Ni/2D bP as recyclable catalyst in the hydrogenation reaction and good catalytic activity together with high selectivity were achieved.[2]

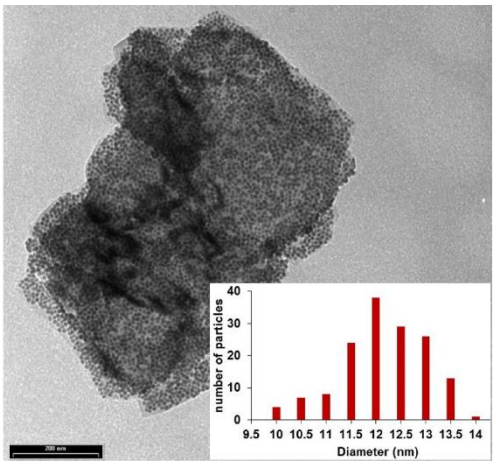

Figure 1. Tem image of Ni NPs supported on 2D bP. Scale bar: 200 nm. Inset: Size distribution histogram of Ni NPs.

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References

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2. Caporali, M.; Serrano-Ruiz, M.; Telesio, F.; Heun, S.; Nicotra, G.; Spinella, C.; Peruzzini, M. *Chem. Commun*. **2017**, *53*, 10946.