EMPIR project COMET: Two dimensional lattices of covalent- and metal-organic frameworks for the Quantum Hall Resistance Standard

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The widespread adoption of graphene devices as Quantum Hall Resistance Standard (QHRS) in metrology, and industrial end-users, is currently limited by the inability to grow large areas of high-quality graphene with uniform, reproducible and stable electric properties (conductivity, doping and mobility). To alleviate these issues, the COMET project will assess and benchmark a new family of graphene-like analogues for realizing the QHRS: two-dimensional lattices of covalent- and metal-organic frameworks [1,2]. These novel Dirac materials can be defined in an atomically precise and scalable manner, holding promise for replacing graphene in metrology and other applications where the "uniqueness" of graphene properties are exploited. The COMET consortium is formed by six European National Metrology Institutes (NMIs) and four academic research institutions. The complementary expertise of the involved NMIs and the academic partners covers theoretical modelling, synthesis, characterization and device engineering.

References

[1] R. Dong et al., Nature Materials, 17 (2018) 1027
[2] Y. Jing and T. Heine, J. Am. Chem. Soc., 141 (2019) 743

Figures

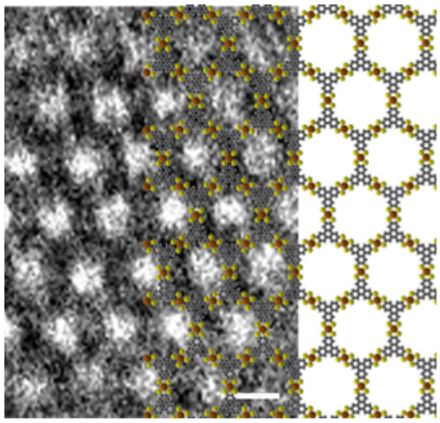

Figure 1: *HRTEM of a graphene-like honeycomb structure for an iron based 2D metal organic framework [1]*