Topological design of magnetic graphene nanostructures

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Precise topological design and engineering of graphene-based quantum nanostructures not only presents exciting opportunities for realizing quantum magnetism but also exotic quantum phases, which marks a crucial step towards the development of next-generation quantum electronics. Recent advances in on-surface synthesis have made it possible to fabricate such atomically precise graphene-based quantum nanostructures via the on-surface synthesis approach, concurrently enabling their characterization at sub-molecular resolutions. In this talk, I will discuss the versatility of this on-surface synthetic strategy, showcasing its capability in intelligently engineering carbon-based quantum nanostructures with different dimensionalities, featuring highly correlated spins, ferromagnetism and unconventional quantum phases [1-4].

References

[1] S Song, et al. Nature 637, 580–586 (2025)
[2] S Song, et al. Nature Chemistry 16, 938–944 (2024)
[3] J Su, JL Li et al. Nature Synthesis 3, 466–476 (2024)
[4] Qiu Zhizhan Nature Materials 23, 1055–1062 (2024)

Figures

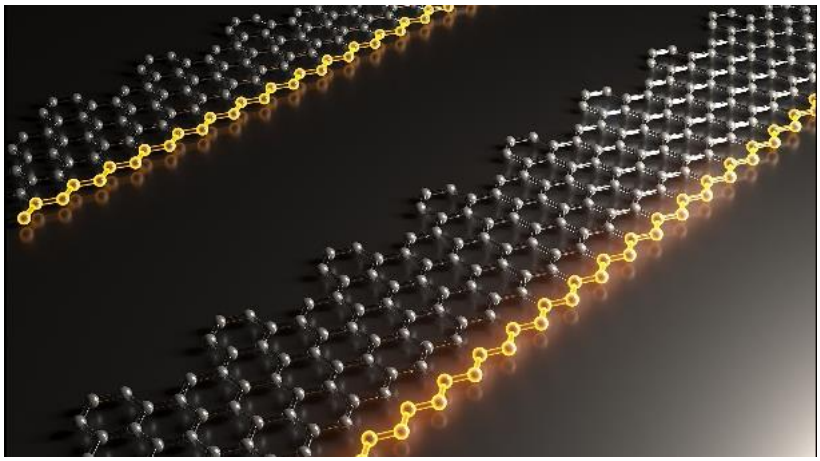

Figure 1: Janus graphene nanoribbons