In this talk, I will describe the recent advances in the on-surface synthesis field. Then, I will discuss our recent results to synthetize atomically precise 2D nanoporous graphene [1], 1D graphene nanoribbons and their chemical functionalization and how to organize them into superlattices[2,3].

At the end of the day, this talk will demonstrate the full path to synthetize a semiconducting graphene material with a bandgap similar to that of silicon, its atomic-scale characterization, and its implementation in an electronic device. Further potential applications include in nanoelectronics, photonics and highly selective molecular filtration and sensing systems.

References