Two-dimensional (2D) black phosphorus (BP) has remarkable electronic properties and application potential in numerous fields. A review of the research on the basic chemical reactivity of 2D BP permits precise engineering of 2D BP’s chemical and electronic properties, enabling its application in fields such as electronics, energy storage, and catalysis. A deep understanding of its chemical reactivity principles is required to fully exploit 2D BP.

Controlled oxidative degradation used for effective top-down BP flake thinning
Non-covalent stabilisation with electron acceptors
High degree covalent functionalisation with alkyl halides using the reductive route
High catalytic potential due to intrinsic electron richness

These insights permit precise engineering of 2D BP’s chemical and electronic properties, enabling its application in fields such as electronics, energy storage, and catalysis.