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Structural design of 2D materials for electronic and optoelectronic applications

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In accordance with Richard Feynman's 1959 statement, "there's plenty of room at the bottom," we explore the structural design space of 2D materials for electronic and optoelectronic applications. Homogenous and inhomogeneous elastic strain [*Nature Photonics* **6** (2012) 866; *MRS Bulletin* **39** (2014) 108], bending [*ACS Nano* **5** (2011) 3475], interlayer twist and slip [*Nano Letters* **14** (2014) 5350] lead to tunable, low-energy artificial atoms, artificial superlattices and pseudoheterostructures that can regulate quasiparticle motion (excitons, electrons). The amenability of 2D materials for mechanical manipulations, combined with lithographic patterning and annealing [*Nanoscale* **4** (2012) 4883; *PNAS* **106** (2009) 10103], could lead to new topological physics [*Science* **346** (2014) 1344] and device designs.