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Formation of hydrogenated graphene nanoripples by strain engineering and directed surface self-assembly[1]
ZHENGFEI WANG, YU ZHANG, FENG LIU, University of Utah, Department of Materials Science and Engineering, FENG LIU'S GROUP TEAM — We propose a class of semiconducting graphene-based nanostructures: hydrogenated graphene nanoripples (HGNRs), based on continuum-mechanics analysis and first-principles calculations. They are formed via a two-step combinatorial approach: first by strain-engineered pattern formation of graphene nanoripples, followed by a curvature-directed self-assembly of H adsorption. It offers a high level of control of the structure and morphology of the HGNRs, and hence of their band gaps, which share common features with graphene nanoribbons. A cycle of H adsorption (desorption) at (from) the same surface locations completes a reversible metal-semiconductor-metal transition with the same band gap.

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