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Controllable strain fields in multimonolayer 2D-layered TiO2 (110) crystals studied by STM[1] ZHISHENG LI, DENIS POTAPENKO, RICHARD OSGOOD, Columbia University — Strain of crystal lattice can change the electronic property of materials, such as oxides and semiconductors, significantly. However, experimental studies of lattice effects in oxides are limited especially in atomic scale, due to the difficulty of generating strain field experimentally. In this work, we generate a strain field in multiple monolayer sample of at TiO2 (110) by very low energy bombardment of single crystal TiO2 samples with argon ions at 1000°C. The interstitial argon diffuses so as to form nanometer scale regions of local exfoliated TiO2 layers. These layers retain their unstressed surface reconstruction although the top-most surface layers have a convex morphology. We use STM studies along with a continuum model to show the strain field. Our studies also show that the strained surface layers are free of oxygen vacancies and that the adsorption energy of hydrogen is altered by the local strain field.

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Zhisheng Li
Columbia University

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