Electronic Supplementary Information

In situ visualization of superior nanomechanical flexibility of individual hydroxyapatite nanobelts

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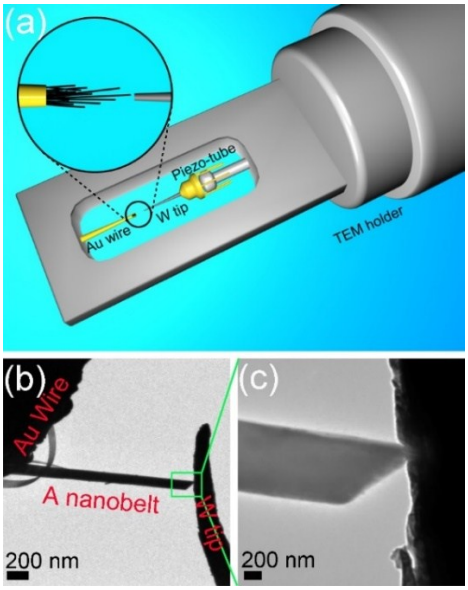

Figure S1. (a) Illustration of the experimental setup used for in situ mechanical measurements. (b) W tip contacting an individual nanobelt inside TEM. (c) An enlarged TEM image of the contact area with the tip penetrated inside the nanobelt.

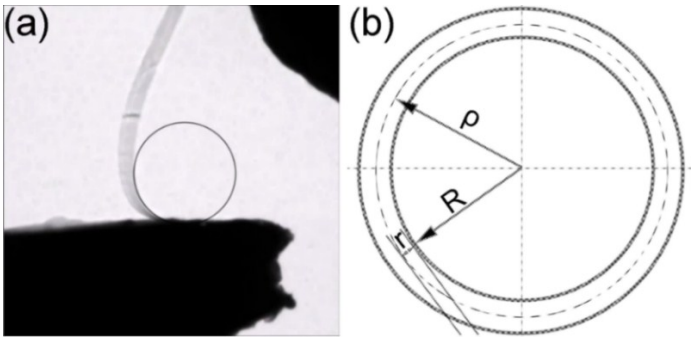

Figure S2. The method of calculating the elastic strain retained in the nanostructure. (a) a TEM snapshot of the bent nanostructure. A large circle is drawn to overlay the bent nanostructure partially. The radius of the large circle ρ is used for the subsequent calculation. (b) the schematic illustration for calculating the elastic strain. *r* is the thickness of the bent nanostructure and *R* is the radius of the large circle where a quarter of the surface area is overlaid with the bent nanostructure. The circular dashed line shows the ideal neutral-stress line in the bent circle.

$$\rho = R + r$$

Calculation of the Elastic Strain:

The elastic strain is calculated by the conventional method for a bent belt/rod. Given a thin belt with average thickness r which is bent elastically to a circular shape with radius R, therefore the maximum elastic strain ε maintained in the bent belt can be calculated to be:

$$\varepsilon = r/(r + R)\%$$

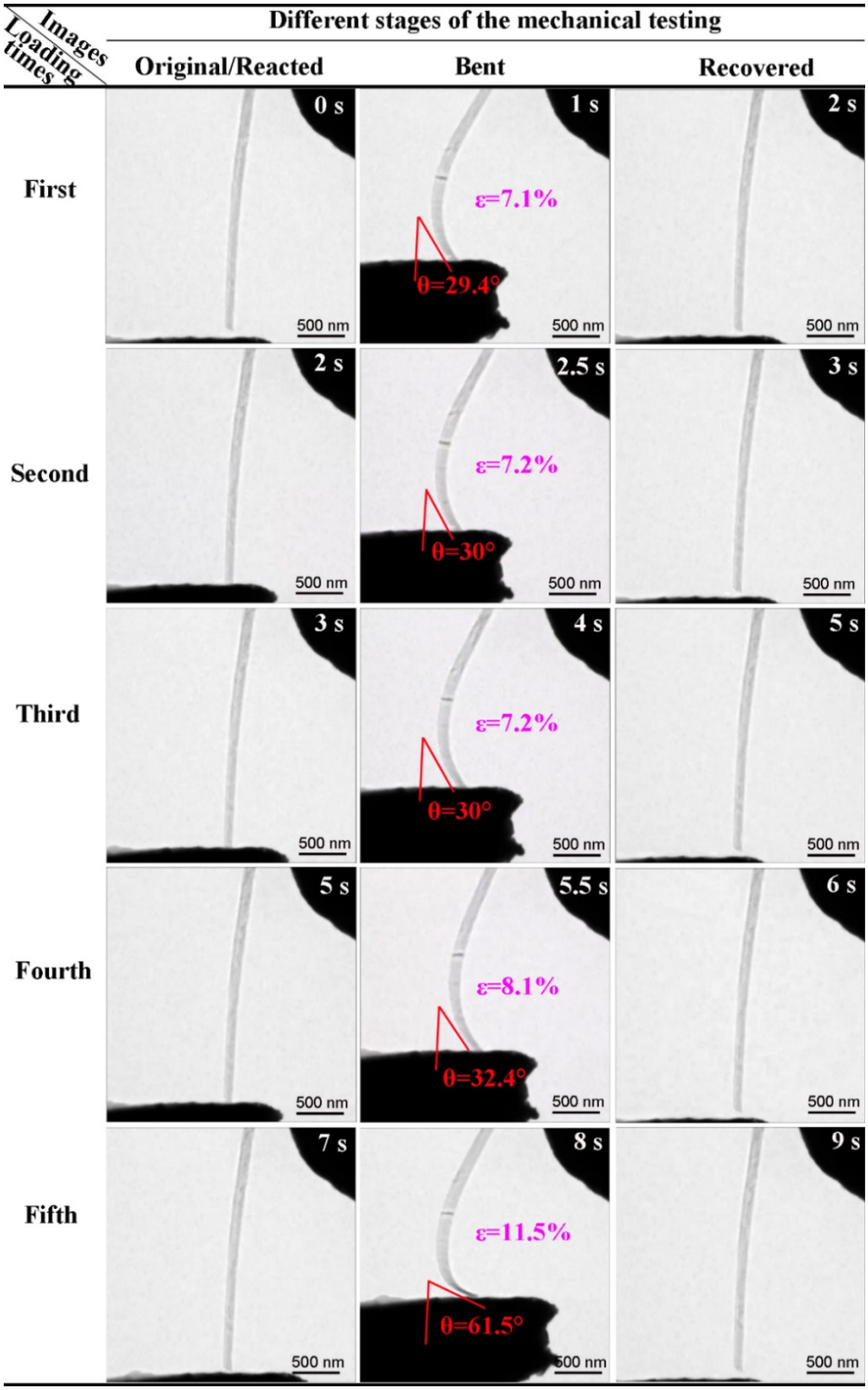

Figure S3. *In situ* TEM snapshot progress of an individual HA nanobelt in the first five compression-recovery cycles. The compression angles and strain at different moments were measured as is indicated by red and purple color in the column of "bent". See the ESI2 Movie (0-9 s).

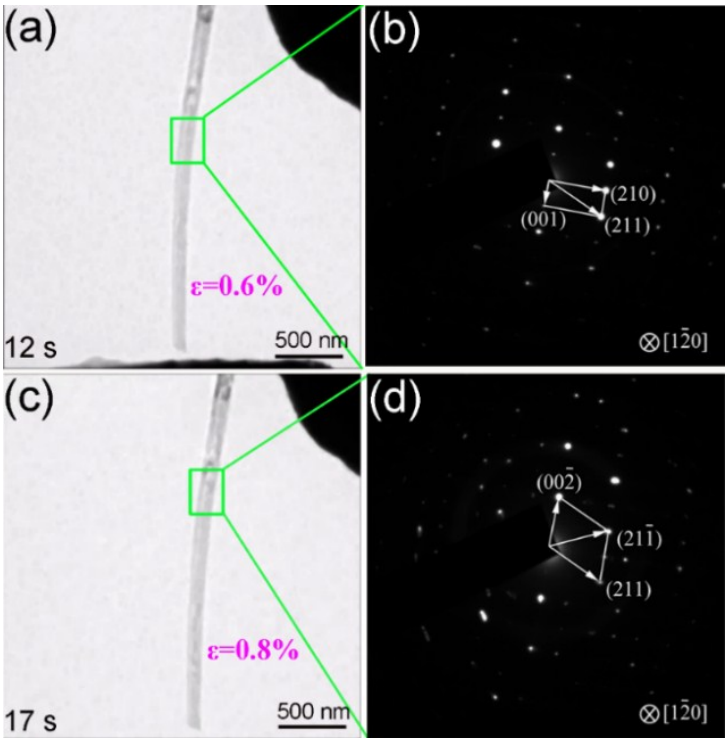

Figure S4. (a) and (c) Images before and after the seventh compression cycles of the nanobelt, (c) and (d) the corresponding SAED patterns from areas marked by green fames in (a) and (c). See ESI2 Movie for details.

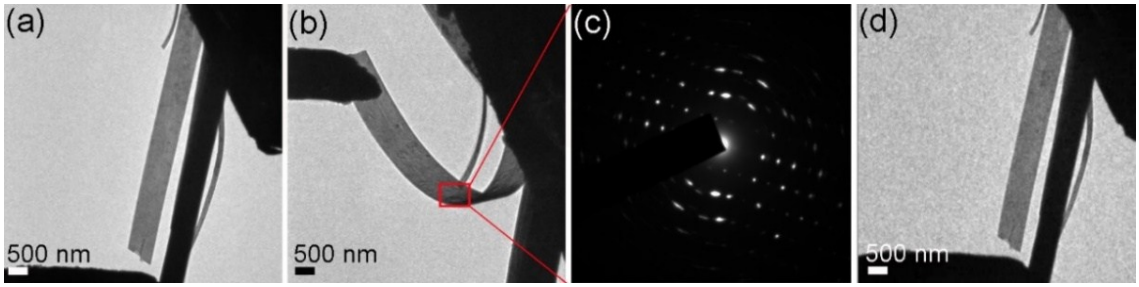

Figure S5. *In situ* TEM snapshot compression progress of another HA nanobelt. (a) the original nanobelt, (b) the nanobelt during compression, (c) the corresponding diffraction patterns of the red frame in (b), and (d) the nanobelt after release. See ESI4 Movie for details.

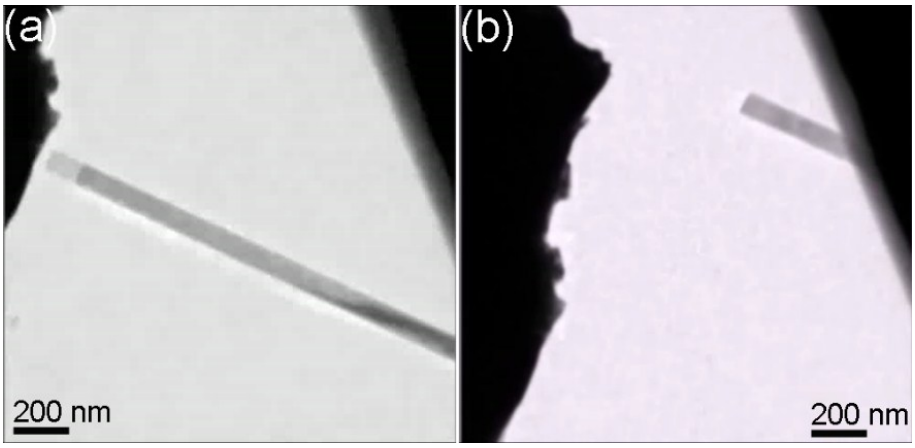

Figure S6. *In situ* TEM snapshots of the HA nanorod taken before and after the compression test. (a) the original state, (b) the final state.

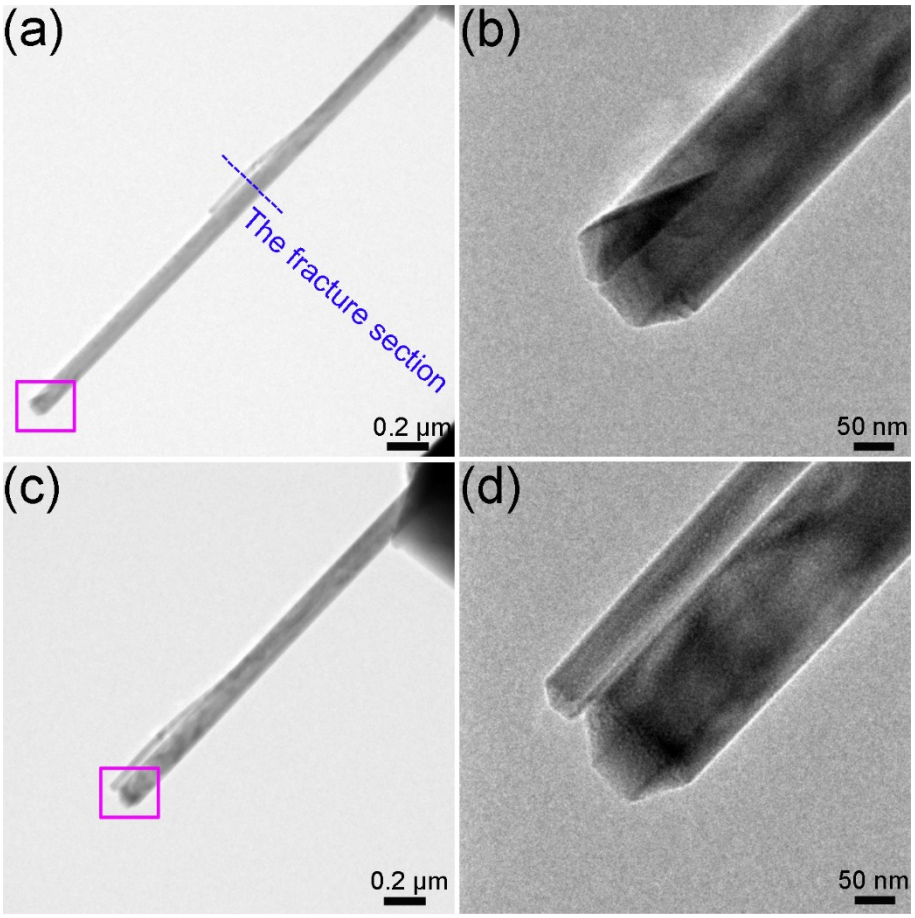

Figure S7. TEM images of another HA nanorod taken before and after the compression test. (a) the original state and (b) the enlarged area of the red frame in (a), (c) the final state and (d) the enlarged area of the frame in (c).