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Supporting Information

Probing the mechanical response of luminescent dithiol protected $Ag_{29}(BDT)_{12}(TPP)_4$ cluster crystals

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Keywords: atomically precise clusters, nanoindentation, single crystal, mechanical properties

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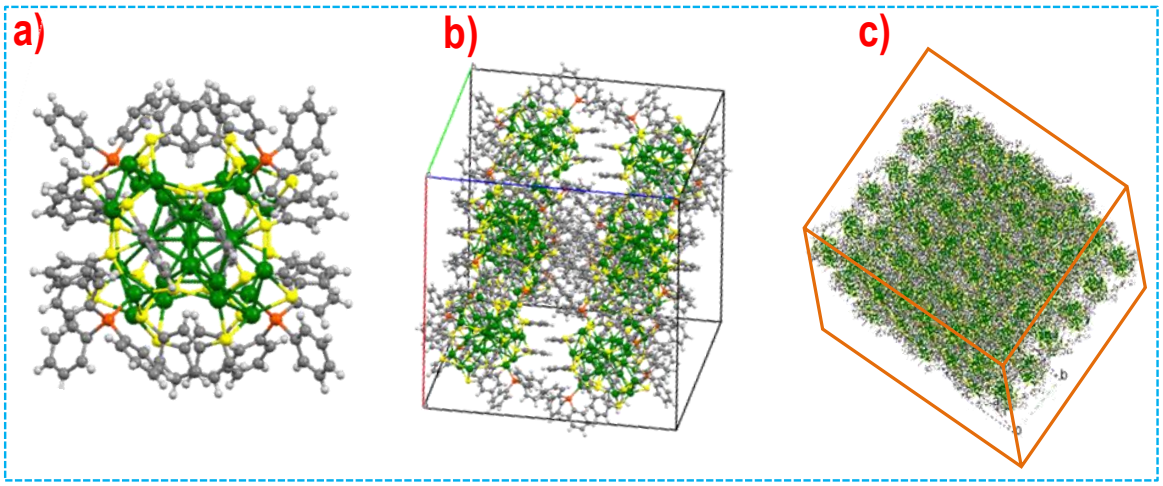

Figure S1. a) Crystal structure of $Ag_{29}(BDT)_{12}(TPP)_4$ cluster. b) The 3D view of the cubic unit cell of **I**. c) The schematic of 2x2 cubic unit cell of **I**. Color legend: green, silver; yellow, sulphur; orange, phosphorous; grey, carbon; white, hydrogen.

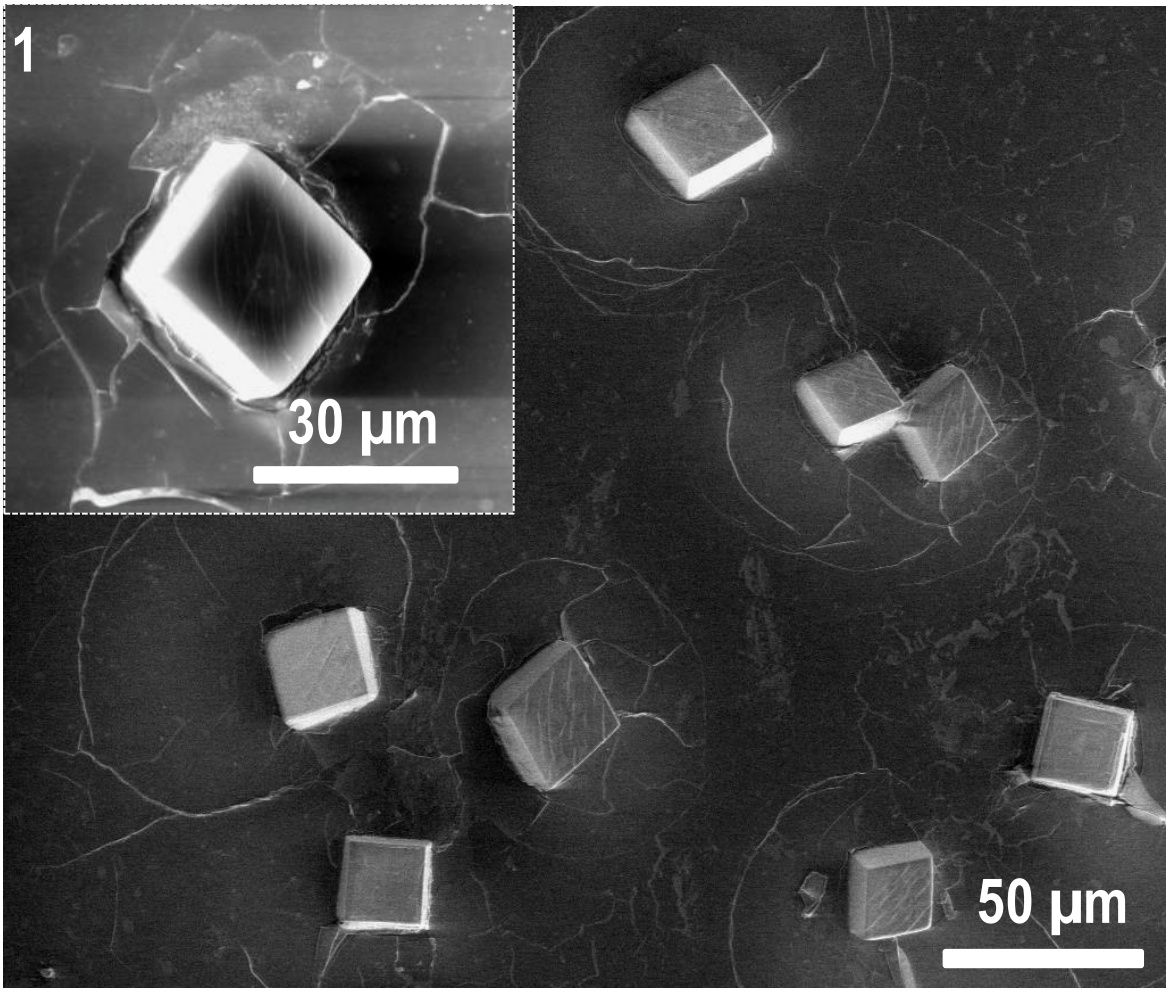

Figure S2. SEM image of **I**. Inset 1 shows a single **I**.

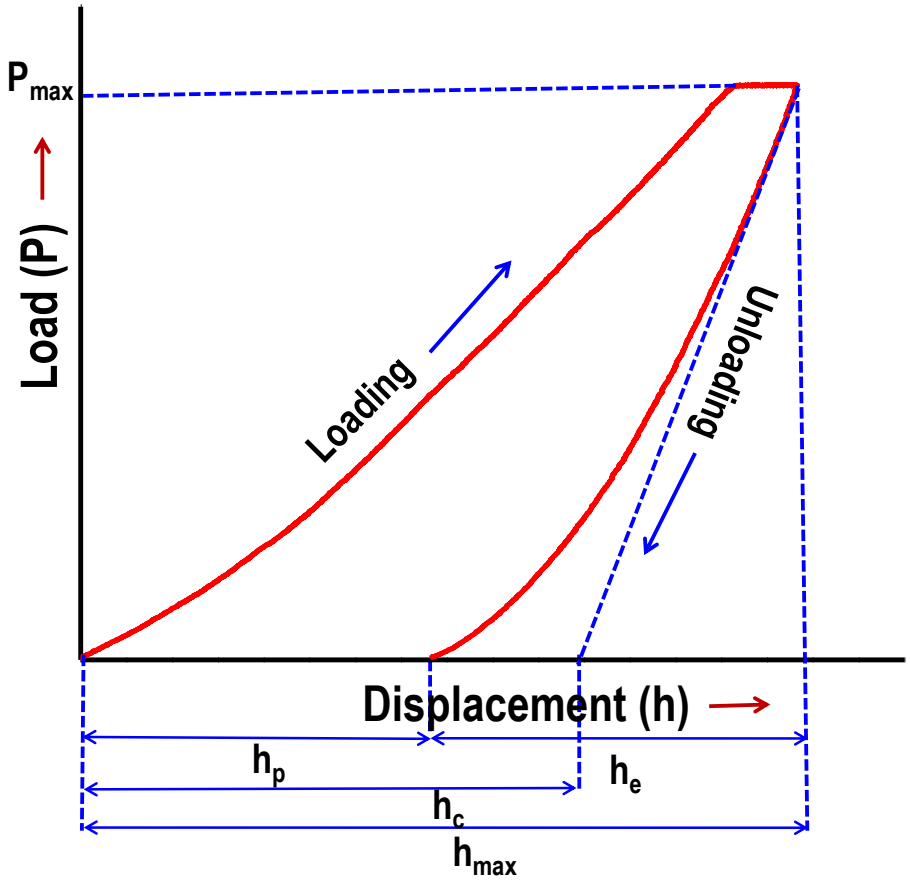

Figure S3. A typical load-displacement curve obtained in a nanoindentation experiment.

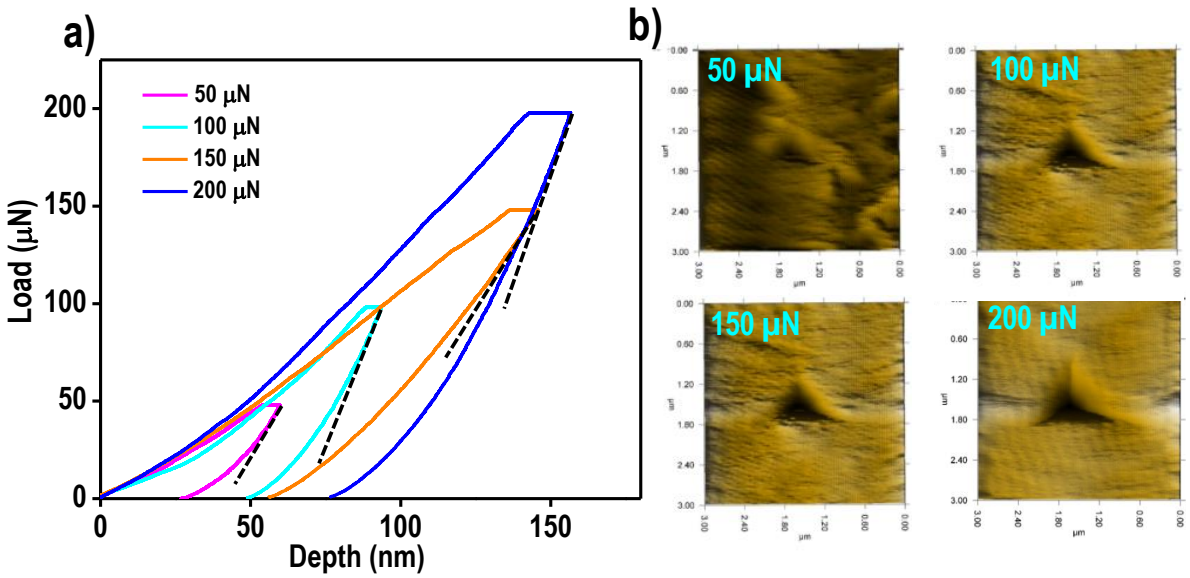

Figure S4. a) Load-displacement curves obtained from multiple indentations by varying the magnitude of load. For all loads, elastic recovery is observed. b) Residual indentation impressions on **I** at different loads.

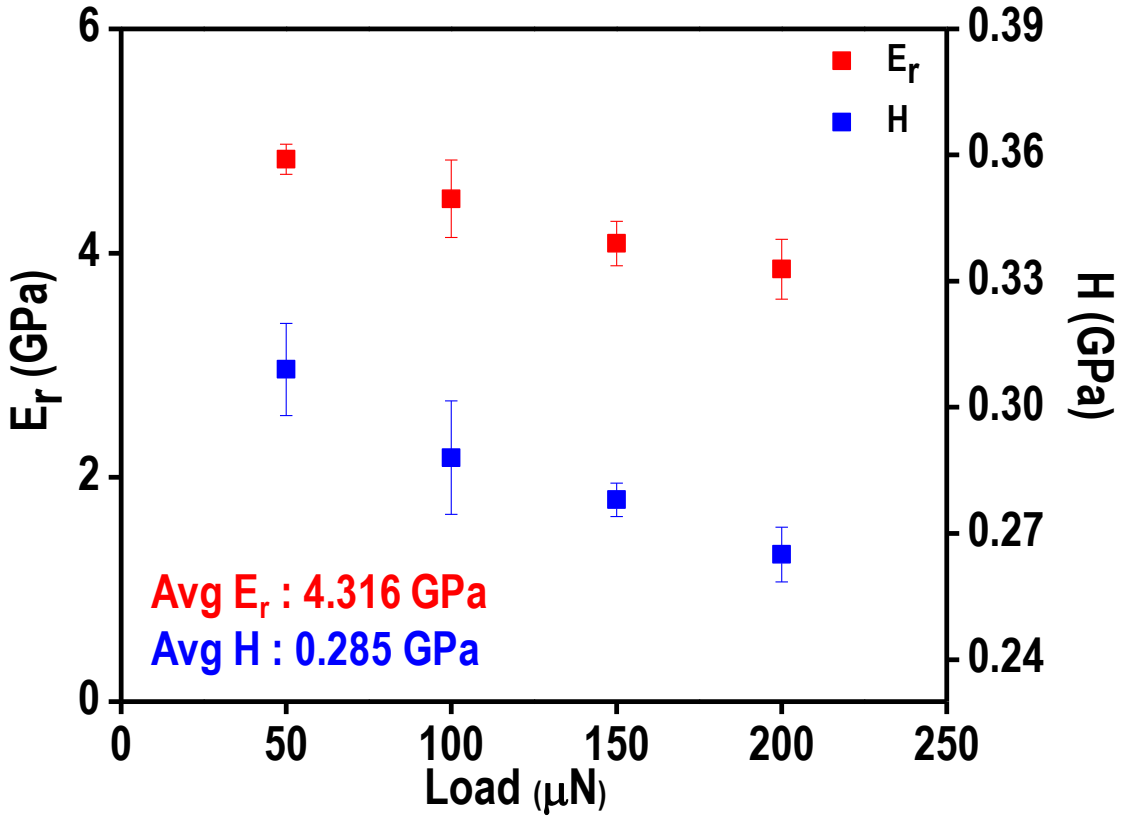

Figure S5. Variation of modulus and hardness as a function of load.

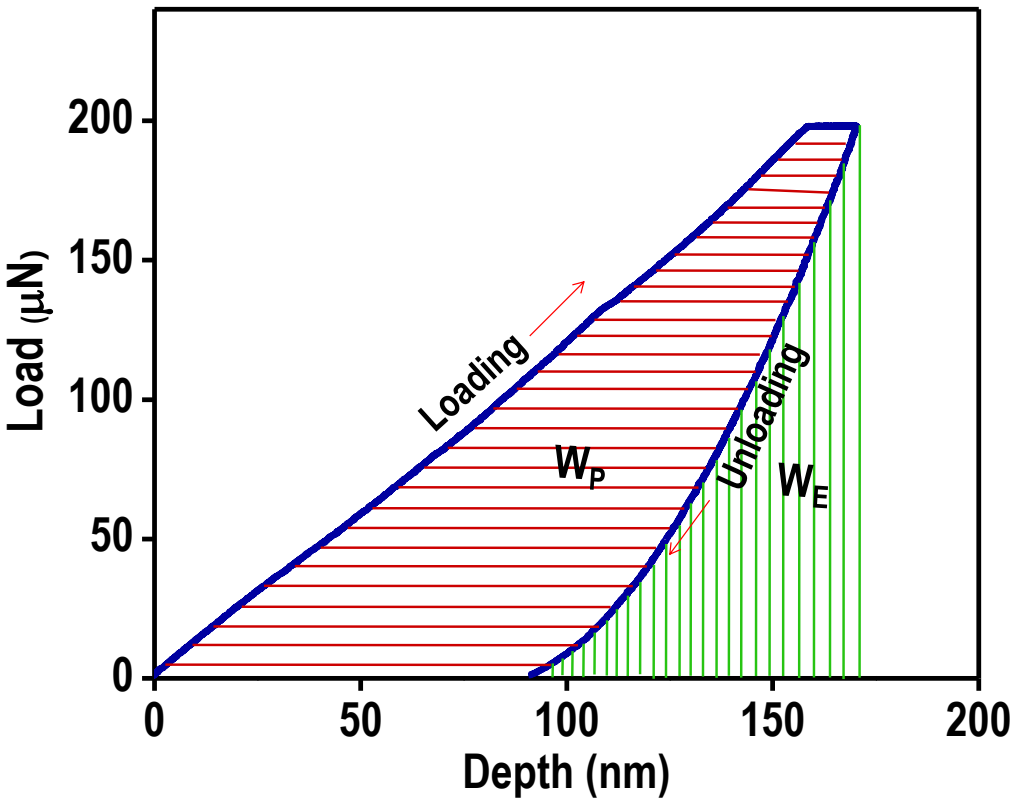

Figure S6. a) Load-displacement curve for 200 μN load. The red shaded area represents the plastic work done and the green shaded area represents the elastic work done.

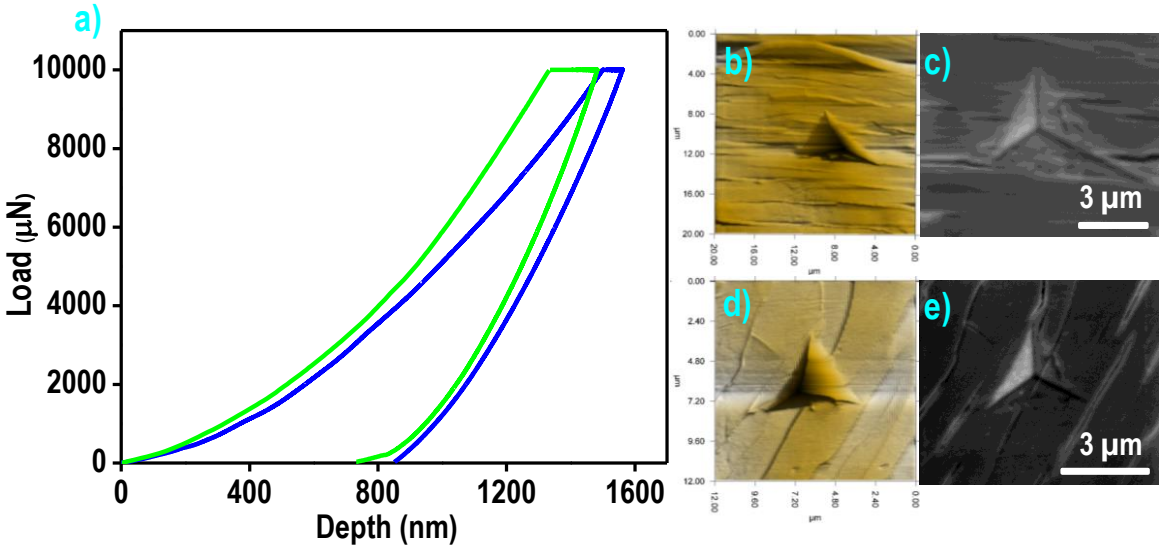

Figure S7. a) Load-displacement curves for 10000 μN load with trapezoidal load function (blue color) and 10000 μN load with higher load rate (i.e.,1000 μN/s) (green color). Image b and c are the piezo and SEM image of residual indentation impression with 10000 μN load.

Image d and e are the piezo and SEM image of residual indentation impression with 10000 µN/s load rate.

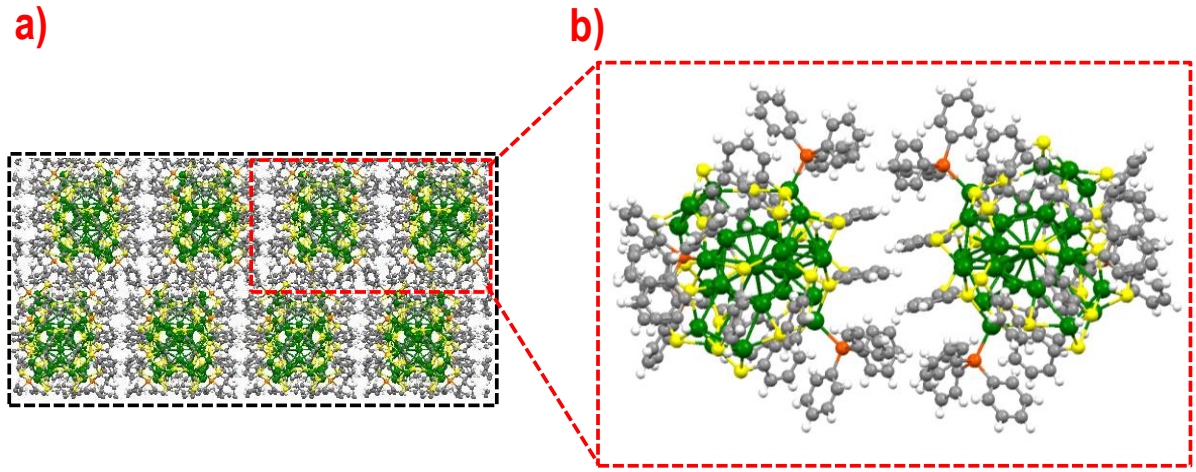

Figure S8. a) Packing of Ag_{29} cluster layers in **I**. b) Expanded view of the intercluster region. Color legend: green, silver; yellow, sulphur; orange, phosphorous; grey, carbon; white, hydrogen.

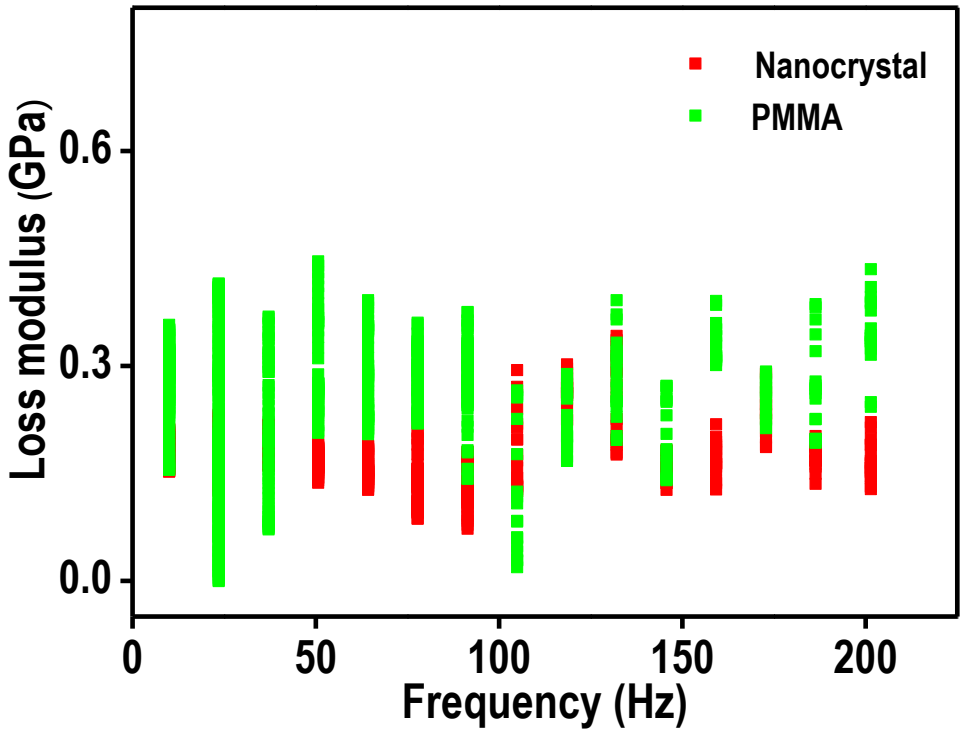

Figure S9. Variation of loss modulus with frequency for **I** (red) and PMMA (green).

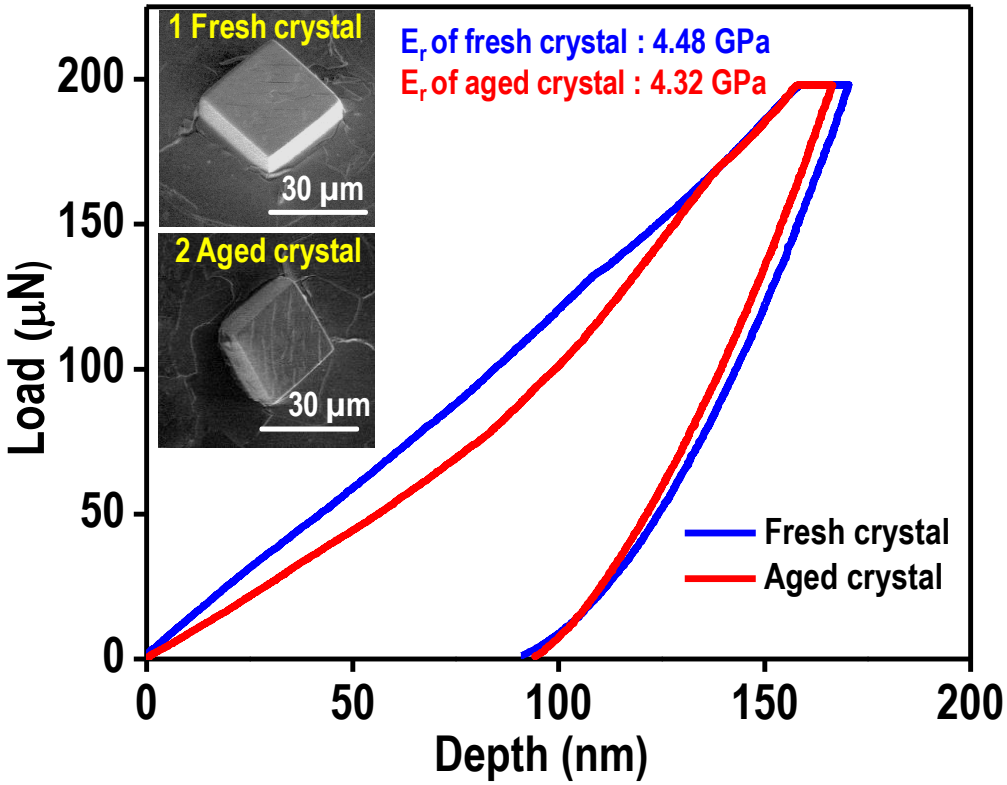

Figure S10. Load-displacement curves for 200 µN load on fresh (blue color) and aged (red color) crystal. Inset 1 and 2 shows the SEM images of fresh and aged crystals.