

Supporting Information

Supercritical CO₂-induced plastic deformation on two-dimensional SrZrO₃ for its multiferroic performance

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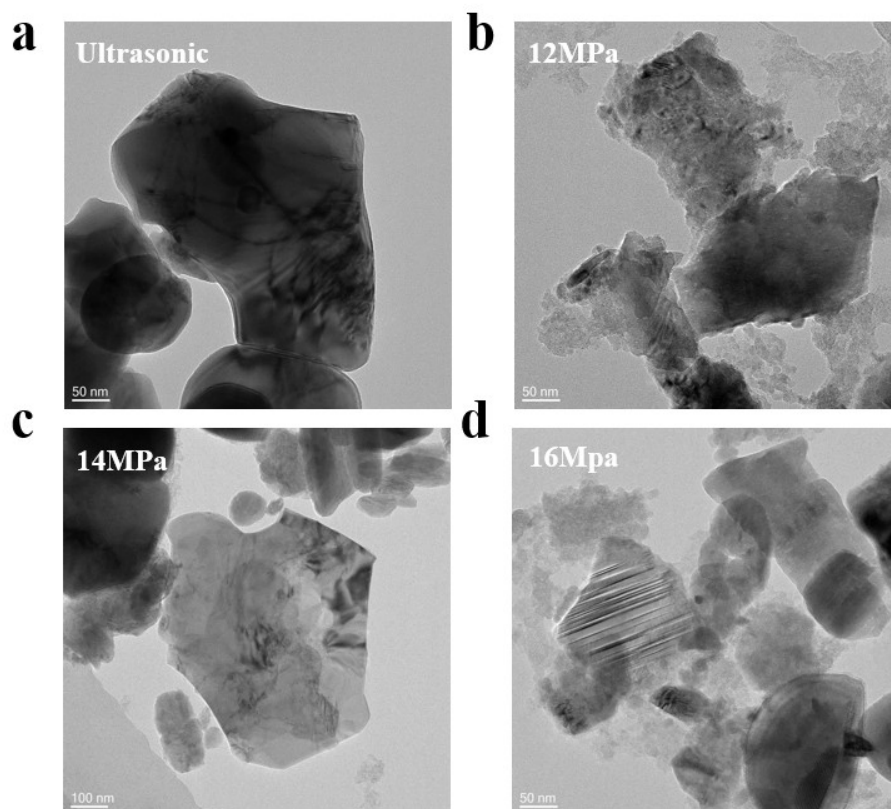


Fig. S1. Low magnification TEM images of the different structures.

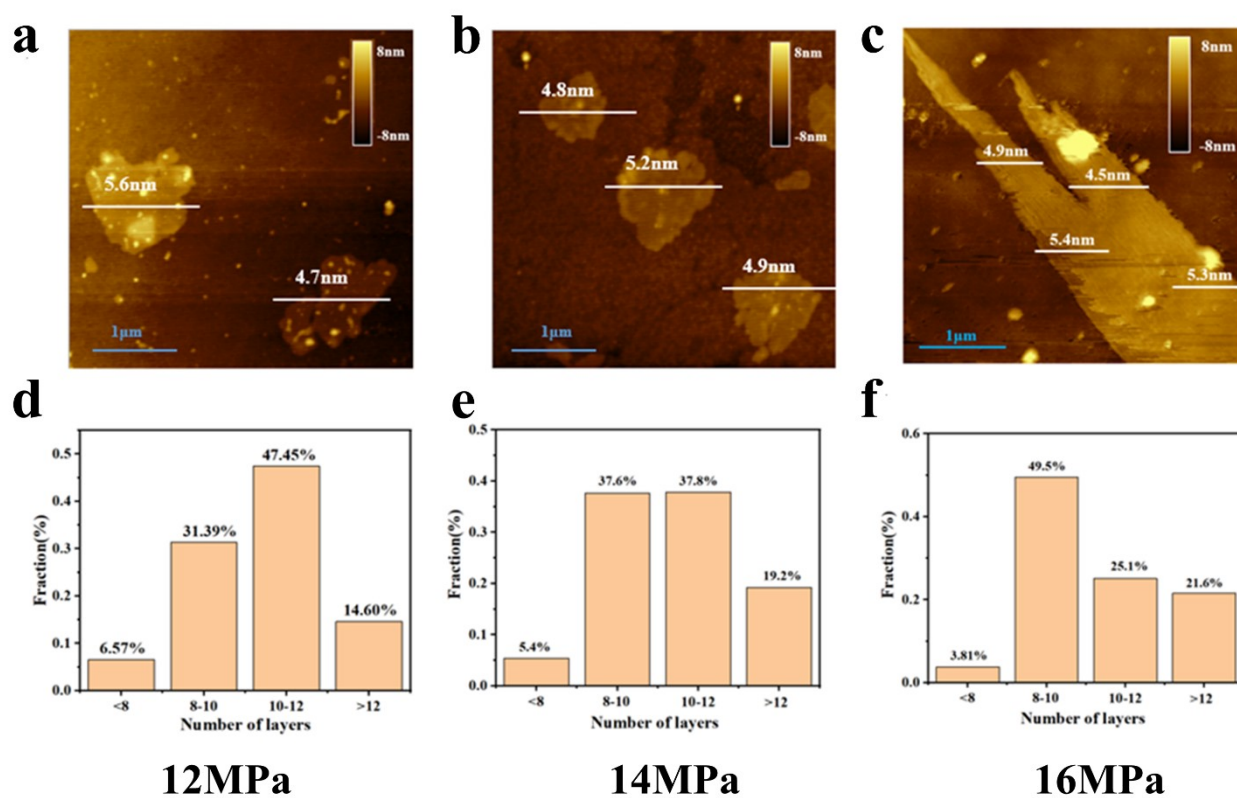


Fig. S2. a-c) AFM image of nanosheets. d-f) Thickness distribution diagram of (a-c).

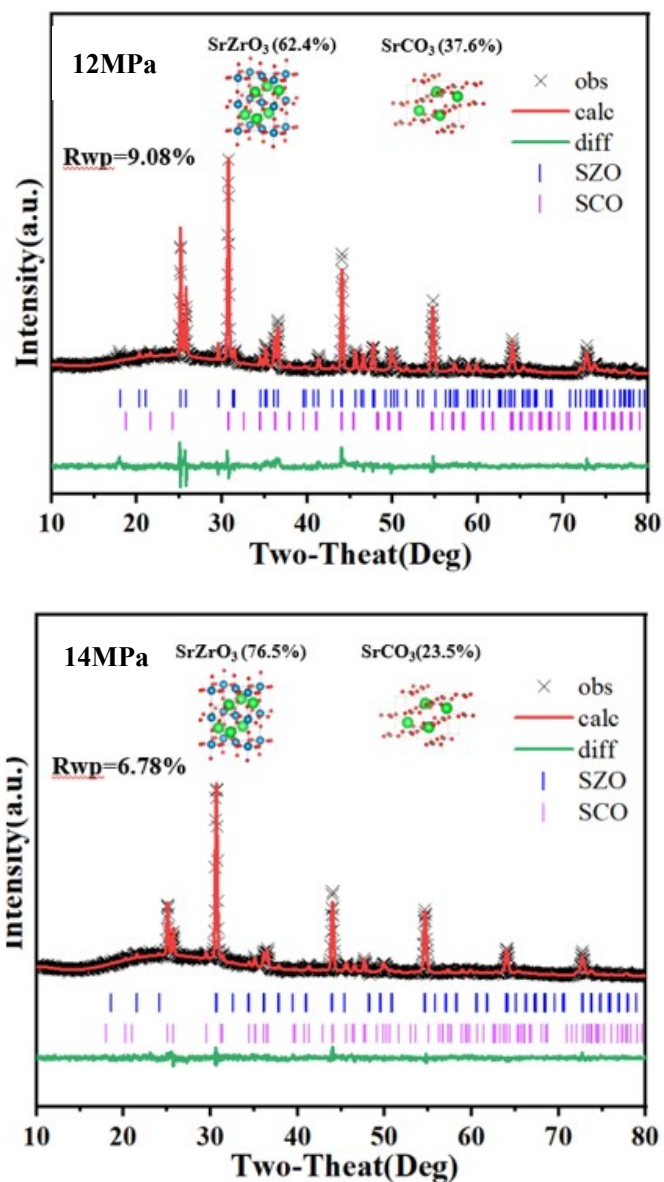


Fig. S3. XRD refinement results of 12MPa and 14MPa

Table S1. Surface lattice constants obtained by XRD refinement

| | a | b | c | V |
|------------|---------|---------|---------|---------|
| Urtlasonic | 5.79378 | 5.80784 | 8.20402 | 276.091 |
| 12Mpa | 5.79443 | 5.80979 | 8.20512 | 276.348 |
| 14MPa | 5.79619 | 5.81916 | 8.20642 | 276.635 |
| 16MPa | 5.79567 | 5.82023 | 8.20612 | 276.810 |

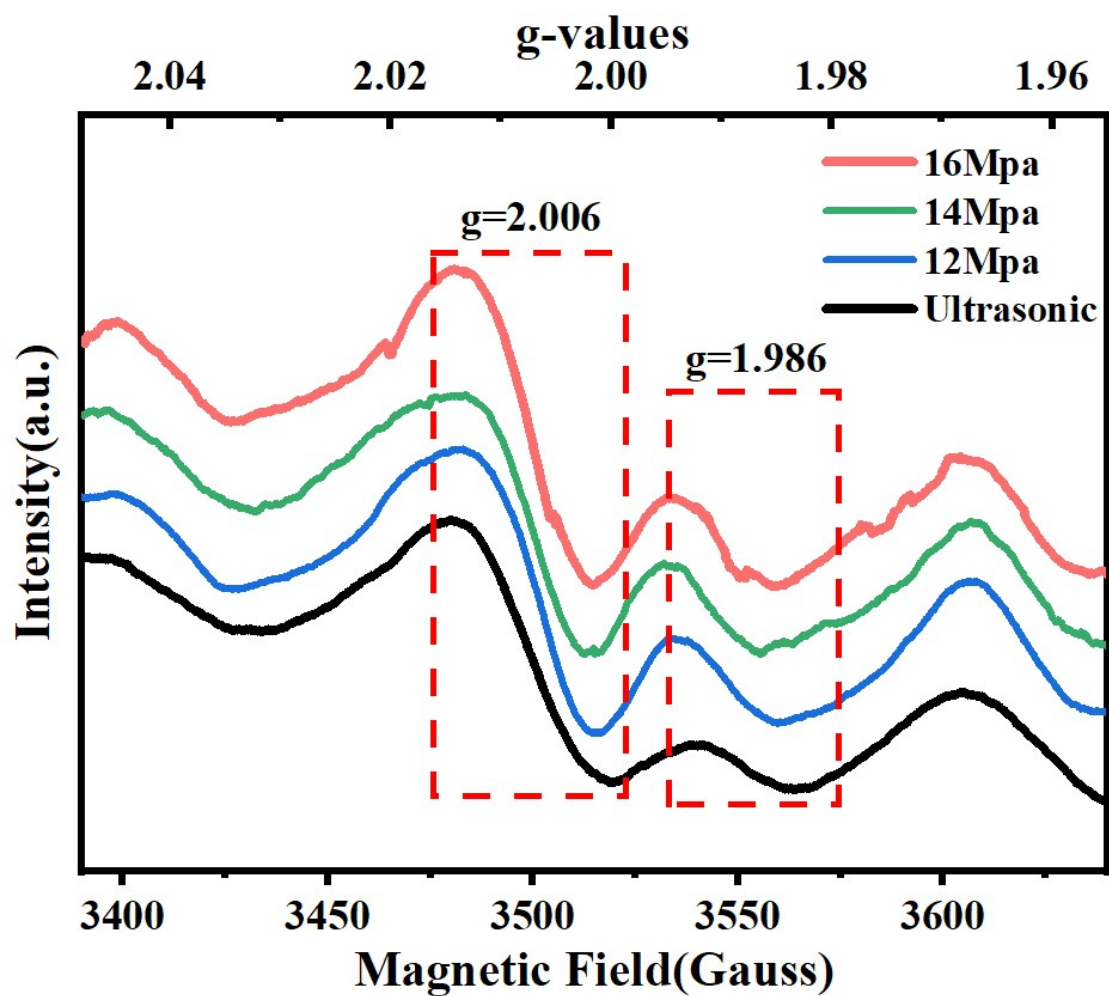


Fig. S4. Electron paramagnetic resonance (EPR) from 12 MPa to 16 MPa SC CO₂

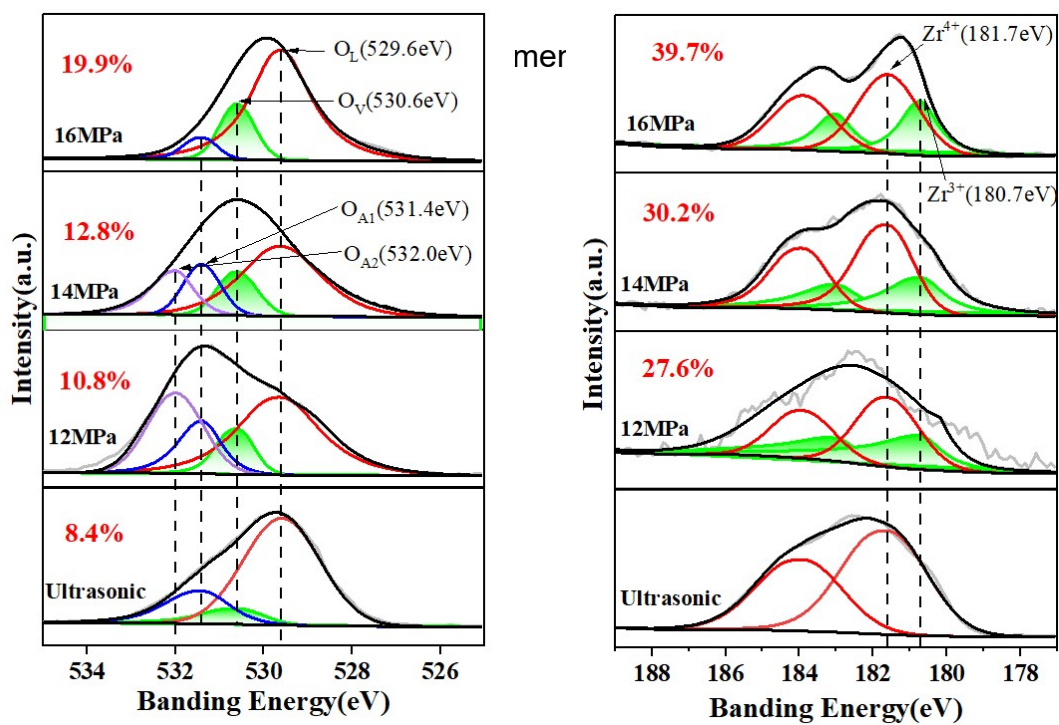


Fig. S5. Characterization of SrZrO_3 treated with different pressure SC CO_2 . a) XPS O_{1s} .
b) XPS Zr_{3d} . The percentages in figures 3a and 3b represent the content of O_V and Zr^{3+} respectively.

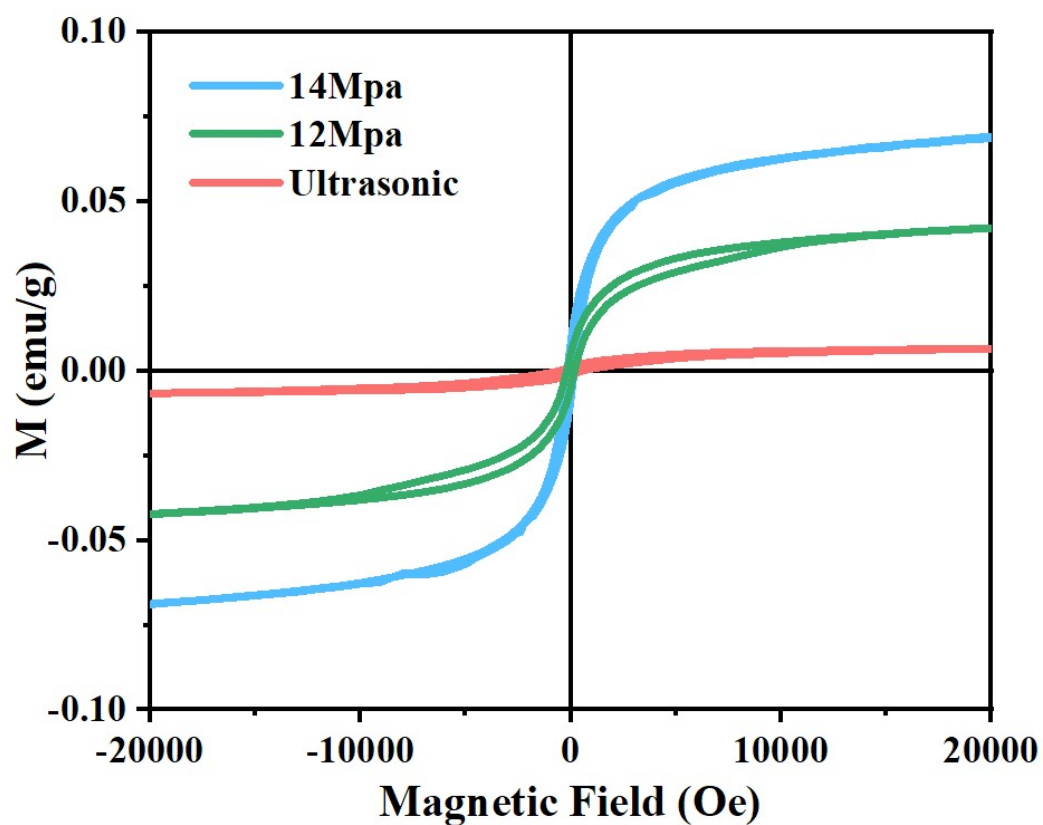


Fig. S6. Hysteresis lines of samples obtained from 12 MPa and 14 MPa SC CO_2 treatment

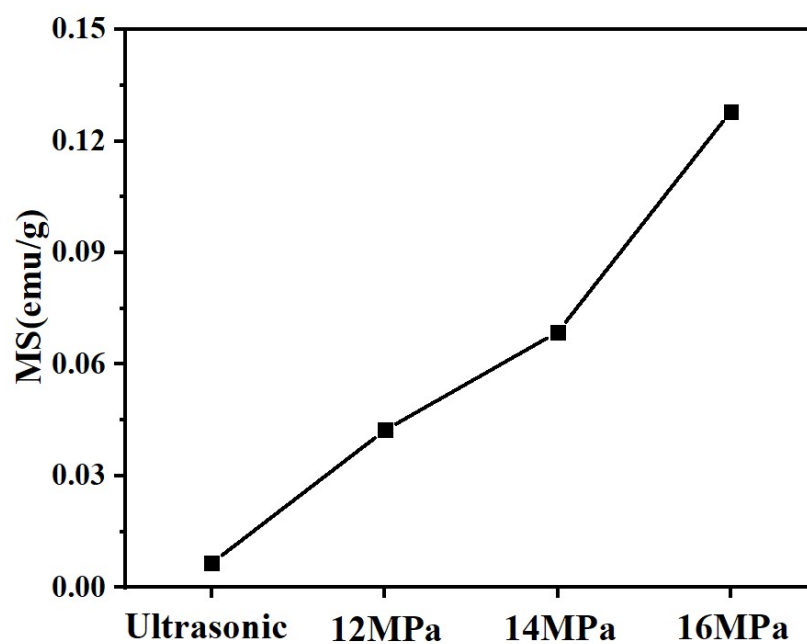


Fig. S7. Schematic diagram of the variation of saturation magnetisation intensity with pressure of SC CO₂.

Table S2. The magnetic properties of nanosheets under different pressure of CO₂.

| | Saturation magnetization (emu/g) | Remanent magnetization (emu/g) | Coercive force (Oe) |
|------------|--|--------------------------------------|------------------------|
| 16MPa | 0.1280 | 0.0146 | 124 |
| 14MPa | 0.0687 | 0.0080 | 149 |
| 12MPa | 0.0423 | 0.0051 | 174 |
| Ultrasonic | 0.0066 | 0.0012 | 549 |