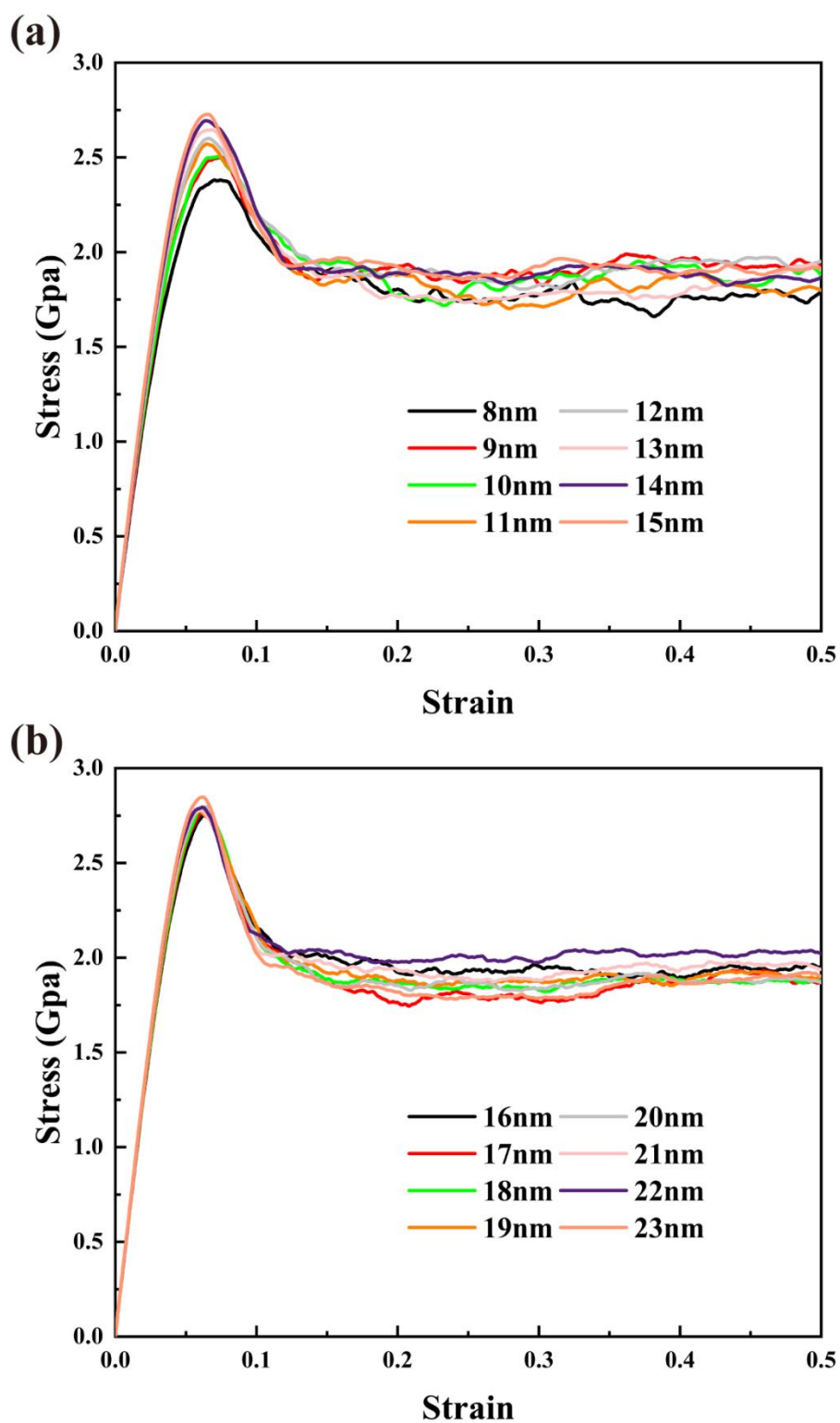
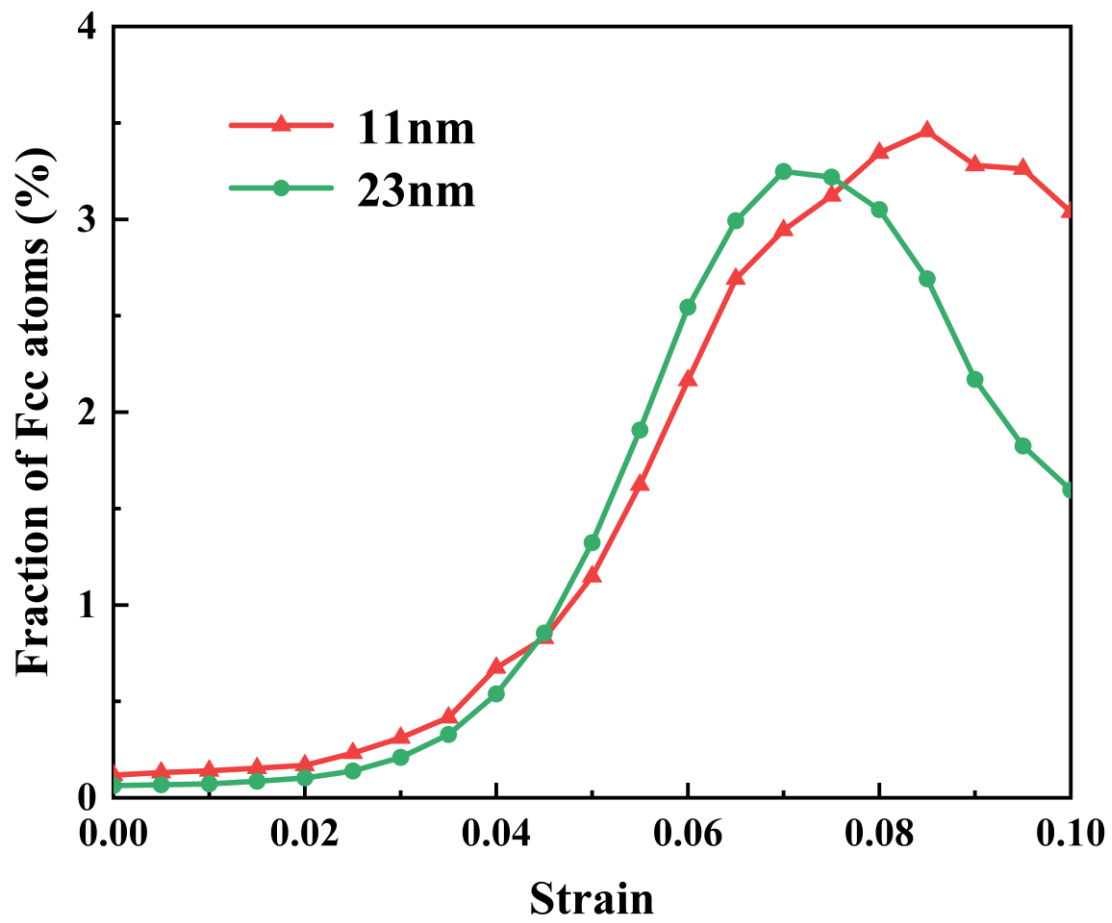


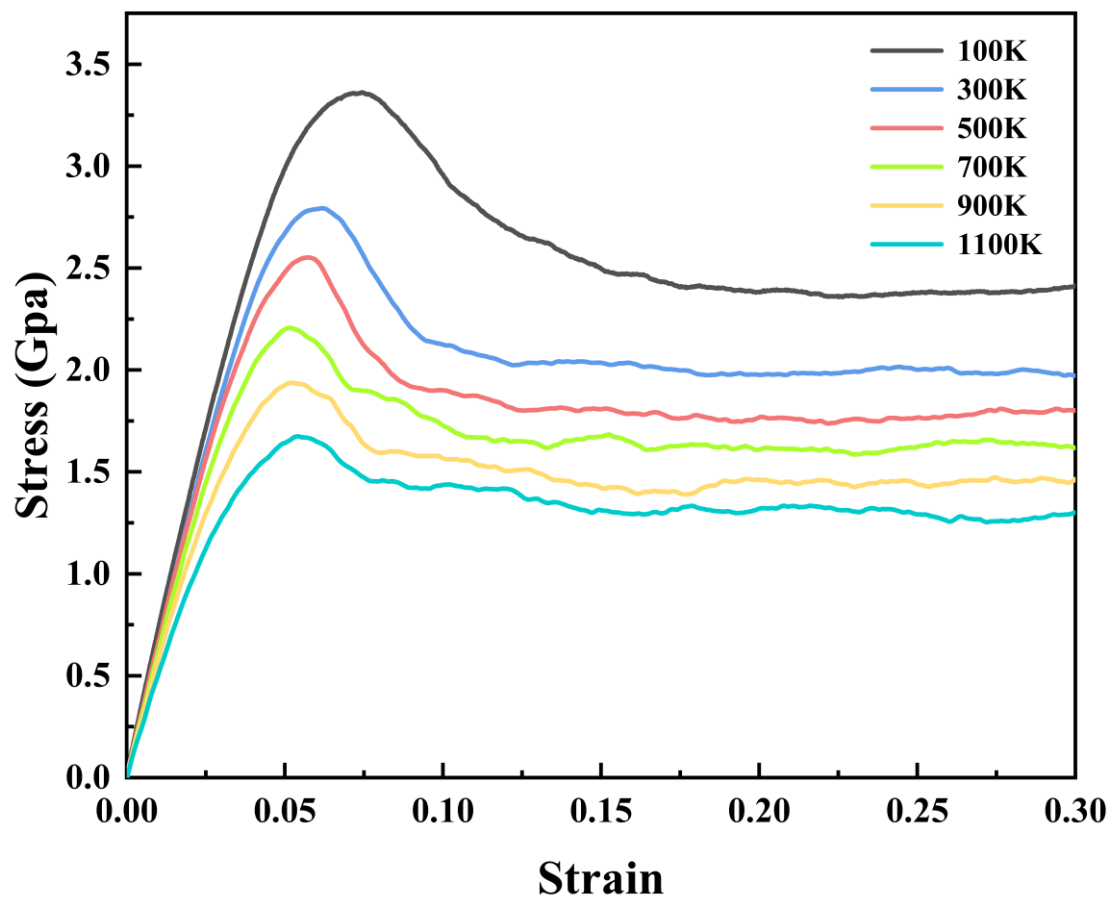
## Supplementary Material



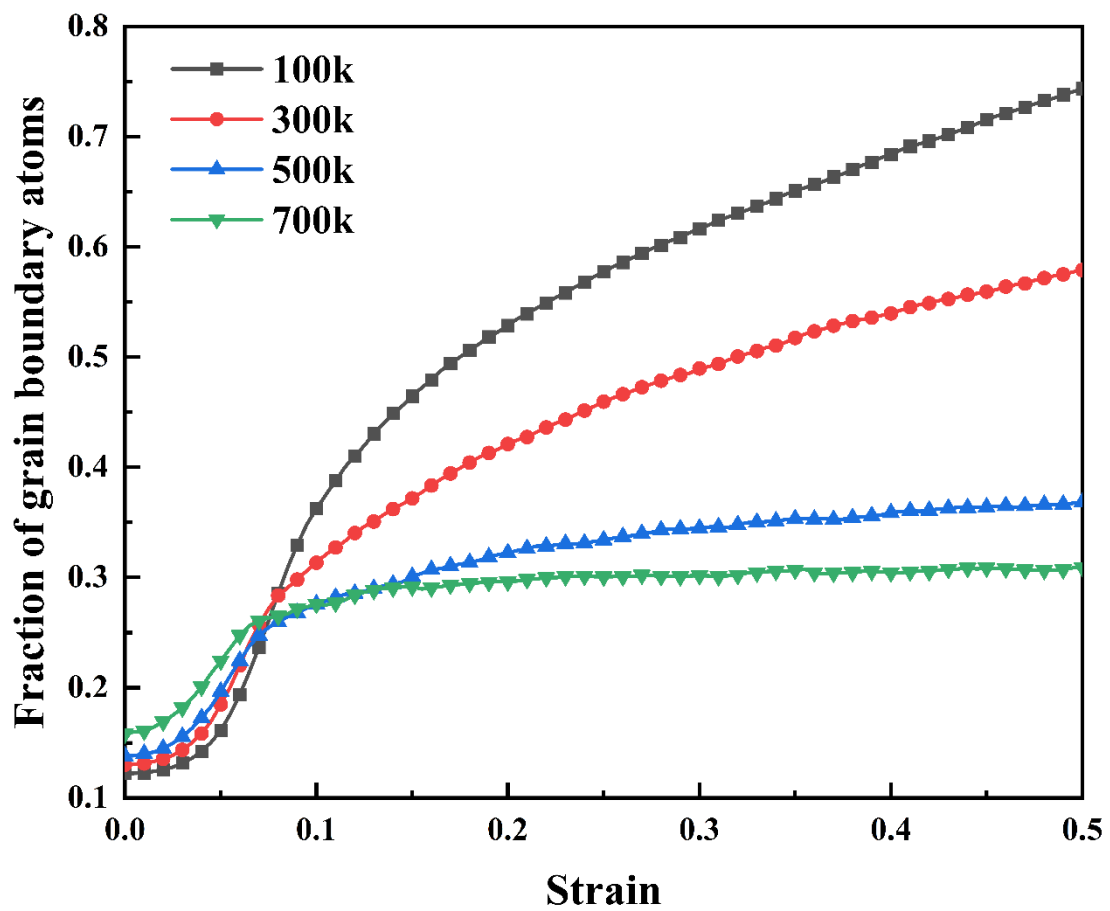
**Figure S1.** Uniaxial tensile stress-strain curves of nanocrystalline U-10Mo alloys with various grain sizes of (a) 8 - 15 nm and (b) 16 - 23 nm.



**Figure S2.** Fraction of fcc atoms in NC U-10Mo alloys with the mean grain size of 11 nm and 23 nm at strains ranging from 0% to 10%, deformed at 300 K and a strain rate of  $5 \times 10^8 \text{ s}^{-1}$ .



**Figure S3.** Tensile stress-strain curves for NC U-10Mo alloys with a grain size of 22 nm for different temperatures at a strain rate of  $5 \times 10^8 \text{ s}^{-1}$ .



**Figure S4.** The evolution of the fraction of grain boundary atoms with strain for samples with grain size  $d = 22$  nm at different temperatures.

**Table S1.** Mechanical properties of nanocrystalline U-10Mo alloys with different grain sizes at 300 K and the strain rate of  $5 \times 10^8 \text{ s}^{-1}$ .

| Average grain size<br>$d$ (nm) | Lenth of sample $L$<br>(nm) | Number of atoms<br>$N$ | Young's modulus<br>$E$ (GPa) | Yield strength<br>$\sigma_s$ (GPa) | UTS<br>$\sigma_b$<br>(GPa) |
|--------------------------------|-----------------------------|------------------------|------------------------------|------------------------------------|----------------------------|
| 8                              | 11.72                       | 67,770                 | 54.71                        | 1.64                               | 3.06                       |
| 9                              | 13.18                       | 97,354                 | 56.33                        | 1.73                               | 3.20                       |
| 10                             | 14.65                       | 134,562                | 56.99                        | 1.76                               | 3.35                       |
| 11                             | 16.11                       | 180,142                | 60.20                        | 1.73                               | 3.52                       |
| 12                             | 17.58                       | 234,963                | 60.29                        | 1.76                               | 3.67                       |
| 13                             | 19.04                       | 299,972                | 61.54                        | 1.88                               | 3.81                       |
| 14                             | 20.50                       | 376,060                | 61.27                        | 1.88                               | 3.83                       |
| 15                             | 21.97                       | 463,916                | 62.62                        | 1.91                               | 3.91                       |
| 16                             | 23.43                       | 564,636                | 62.93                        | 1.96                               | 4.04                       |
| 17                             | 24.90                       | 678,870                | 63.41                        | 1.98                               | 4.00                       |
| 18                             | 26.36                       | 807,584                | 63.82                        | 1.98                               | 4.01                       |
| 19                             | 27.83                       | 951,400                | 64.12                        | 2.02                               | 4.08                       |
| 20                             | 29.29                       | 1,111,632              | 64.47                        | 2.11                               | 4.18                       |
| 21                             | 30.76                       | 1,288,883              | 64.47                        | 2.12                               | 4.20                       |
| 22                             | 32.22                       | 1,483,861              | 65.13                        | 2.10                               | 4.19                       |
| 23                             | 33.69                       | 1,697,944              | 65.25                        | 2.13                               | 4.20                       |