**Supplementary Materials for**

**Ductility by shear band delocalization in the nano-layer of gradient structure**

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**Digital image correlation imaging**

 The digital image correlation (DIC) imaging was attached to provide a large optical field-of-view with representative statistics on the top NS surface of GS samples. The DIC tensile tests were also conducted in CG samples for comparison. The specific commercial VIC-2D software was utilized for DIC data analysis and strain-field calculation. The longitudinal (axial) strains ($ε\_{L}$) in the gauge section were recorded continuously with increasing applied tensile strain ($ε\_{app}$). The localized strain rate ($\dot{ε}\_{L}$) was also calculated in terms of ${\dot{ε}\_{L}=∂ε}/{∂t}$. Also, the interrupted DIC tensile tests were conducted for the microstructural observations, texture analysis, and Vickers micro-hardness (Hv) measurements in the NS surface layer.



Fig. S1 Tensile deformation in homogeneous CG sample. (a) Longitudinal strain ($ε\_{L}$) contour maps at varying applied strains ($ε\_{app}$). Number above each contour: $ε\_{app}$, %. Scale bar: the range of $ε\_{L}$ inside each contour. Two numbers at both ends: maximum and minimum of $ε\_{L}$. (b) and (c) Distribution of both $ε\_{L}$ and $\dot{ε}\_{L}$. Horizontal dashed line in (C) applied strain rate of 8×10-4 s-1.

During uniform tensile deformation, $ε\_{L}$ is almost uniform, even more or less waved (Fig. 2d), and equal to $ε\_{app}$ everywhere along the line in the gauge section. $\dot{ε}\_{L}$ is also uniform, equal to $\dot{ε}\_{app}$. Upon diffused necking at EU of 26% (➁ in Fig. 2b), $ε\_{L}$ rises moderately (indicated by an arrow in Fig. 2b) at the place where the neck is (arrow in Fig. 2b), but with an evident rise of $\dot{ε}\_{L}$.