Electronic Supplementary Material (ESI) for Nanoscale.

Influence of supporting amorphous carbon film thickness on measured strain variation within a nanoparticle

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Electronic Supplementary Information

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Strain variation in unsupported nanoparticle with relaxation

The histograms depicting the strain distribution within the unsupported and relaxed nanoparticle of 1.5 nm thickness are shown in Fig. S1. The overall strain variation is calculated as the difference in maximum and minimum strain value. The strain variation is in the range of 1.5-2.5%. In contrast, the overall strain variation within the experimental nanoparticle is in the range of 20-30%. This clearly shows that surface relaxation alone cannot account for the high amount of strain variation observed in the experimental nanoparticle.

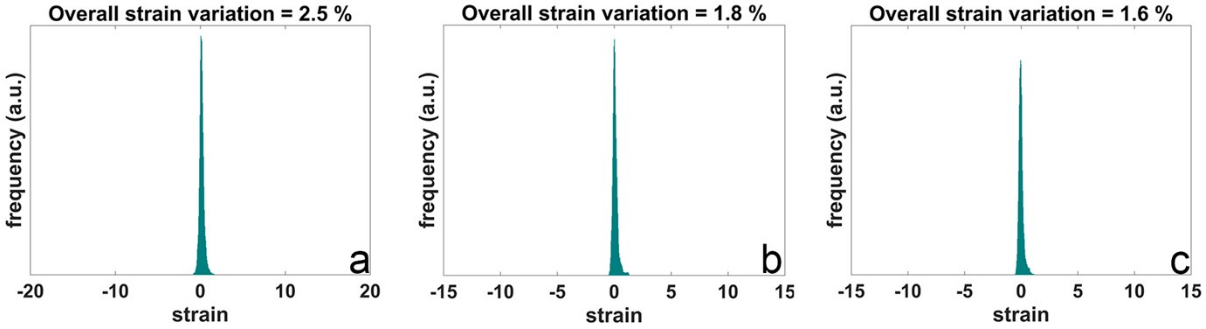

Figure S1 Histograms of strain distribution of symmetric strain components (a) ε_{xx} (b) ε_{xy} and (c) ε_{yy} for 1.5nm thick unsupported, relaxed nanoparticle. The corresponding strain maps are in Panel A, B and C of Fig. 6f respectively.

Effect of reference region on the measured strain variation

The measured strain distribution within an imaged region depends on the reference region used to calculate the geometric phase. Two such regions are indicated by black arrows in Fig. S2 for the 1.5nm nanoparticle supported on 25nm amorphous carbon film. Same sized regions were selected. We have chosen regions where the phase change is almost constant or slowly varying. Due to the change in reference region the reference lattice used for measuring the strain changes which in turn alters the calculated geometric phase as depicted in Fig S1 a and b. This change finally leads to shift in the strain distribution. Comparing the ε_{xx} components (c and d in Fig. S2), the ε_{xx} component corresponding to region indicated in (a) of Fig. S2 is shifted towards negative strain direction while the ε_{xx} component corresponding to the region indicated in (b) of Fig. S2 is shifted towards the positive strain direction. However, the strain distributions do not change significantly and in this case the maximum change in the FWHM is 0.2% which is well within the error limit of GPA (mentioned in Table 1 and in Fig. 5) as applied to our simulated nanoparticle.

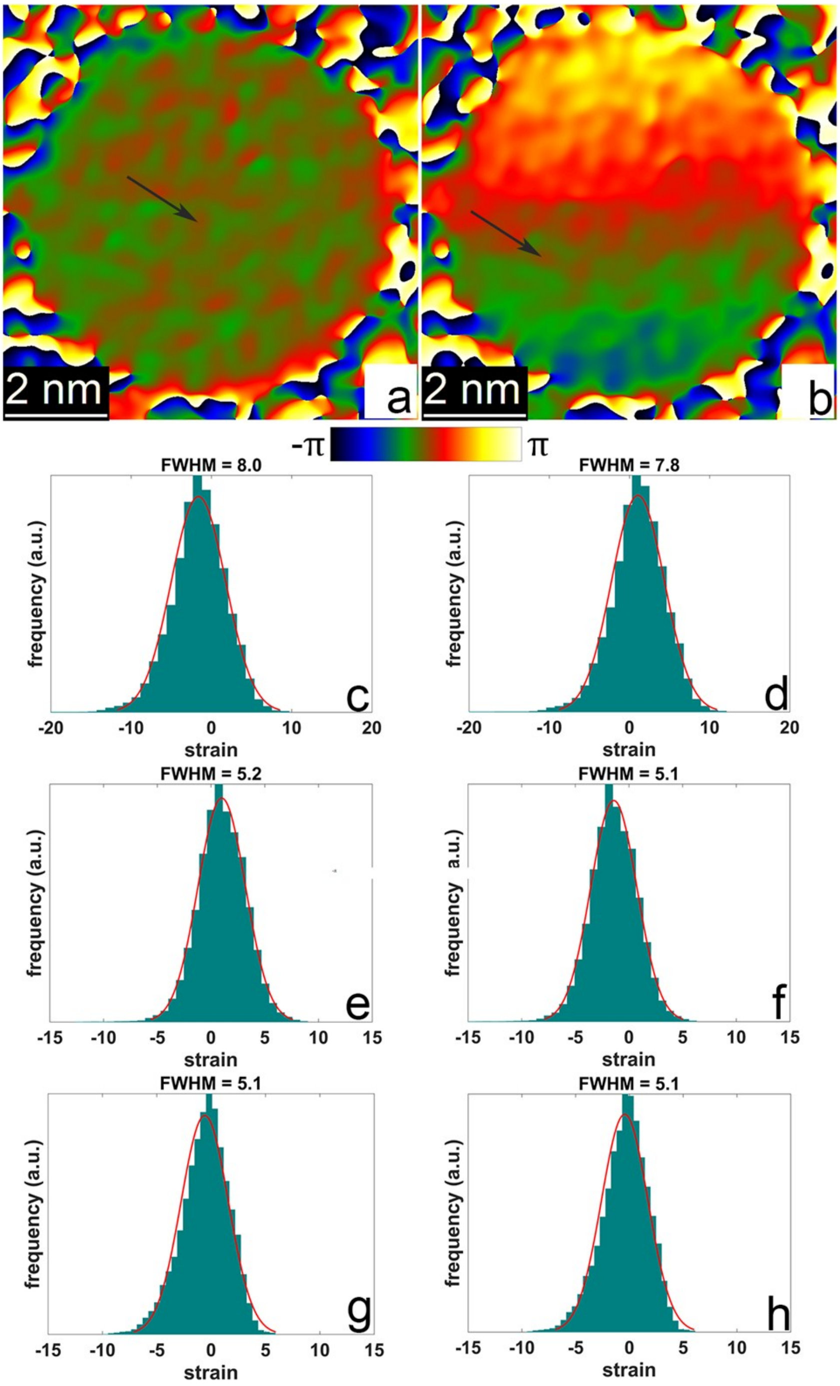

Figure S2 (a), (b) Geometric phase images of 1.5nm thick nanoparticle, supported on 25 nm amorphous carbon film, corresponding to 2 different reference regions. The distribution of symmetric strain components ε_{xx}, ε_{xy} and ε_{yy} corresponding to the region indicated in (a) are shown in (c, e, and g) and those for the region indicated in (b) are shown in (d, f, and h).