

Supporting Information:

Inelastic Light Scattering by Long Narrow Gold Nanocrystals: When Size, Shape, Crystallinity and Assembly Matter

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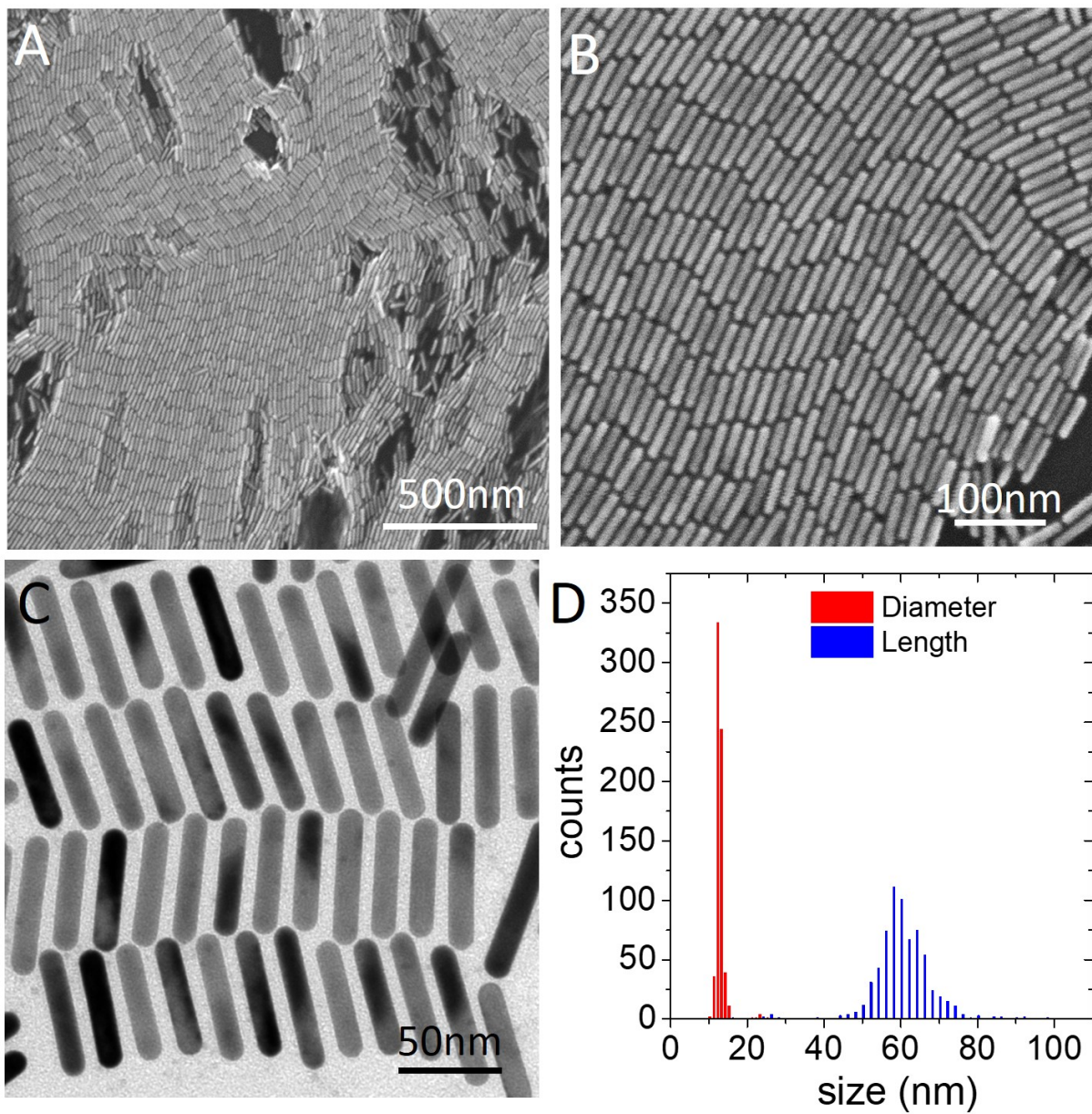


Figure S1: Gold nanorods (NRs) issued from sample NR#1: (A) SEM and (B) HRSEM images of NRs self-organized on a Si wafer. (C) TEM image showing single domain NRs. (D) Diameter and length distributions.

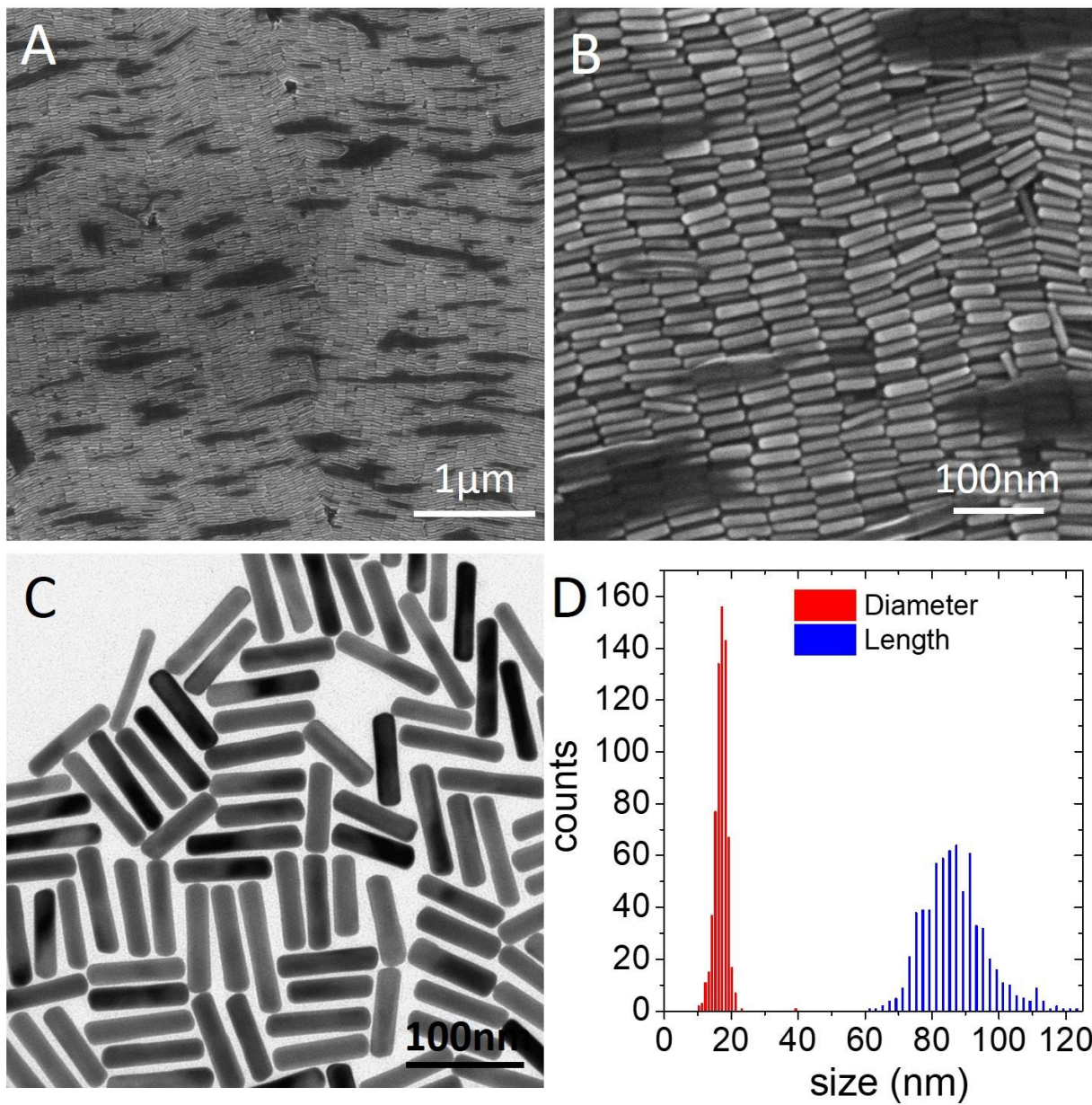


Figure S2: Gold NRs issued from sample NR#2: (A) SEM and (B) HRSEM images of NRs self-organized on a Si wafer. (C) TEM image showing single domain NRs. (D) Diameter and length distributions.

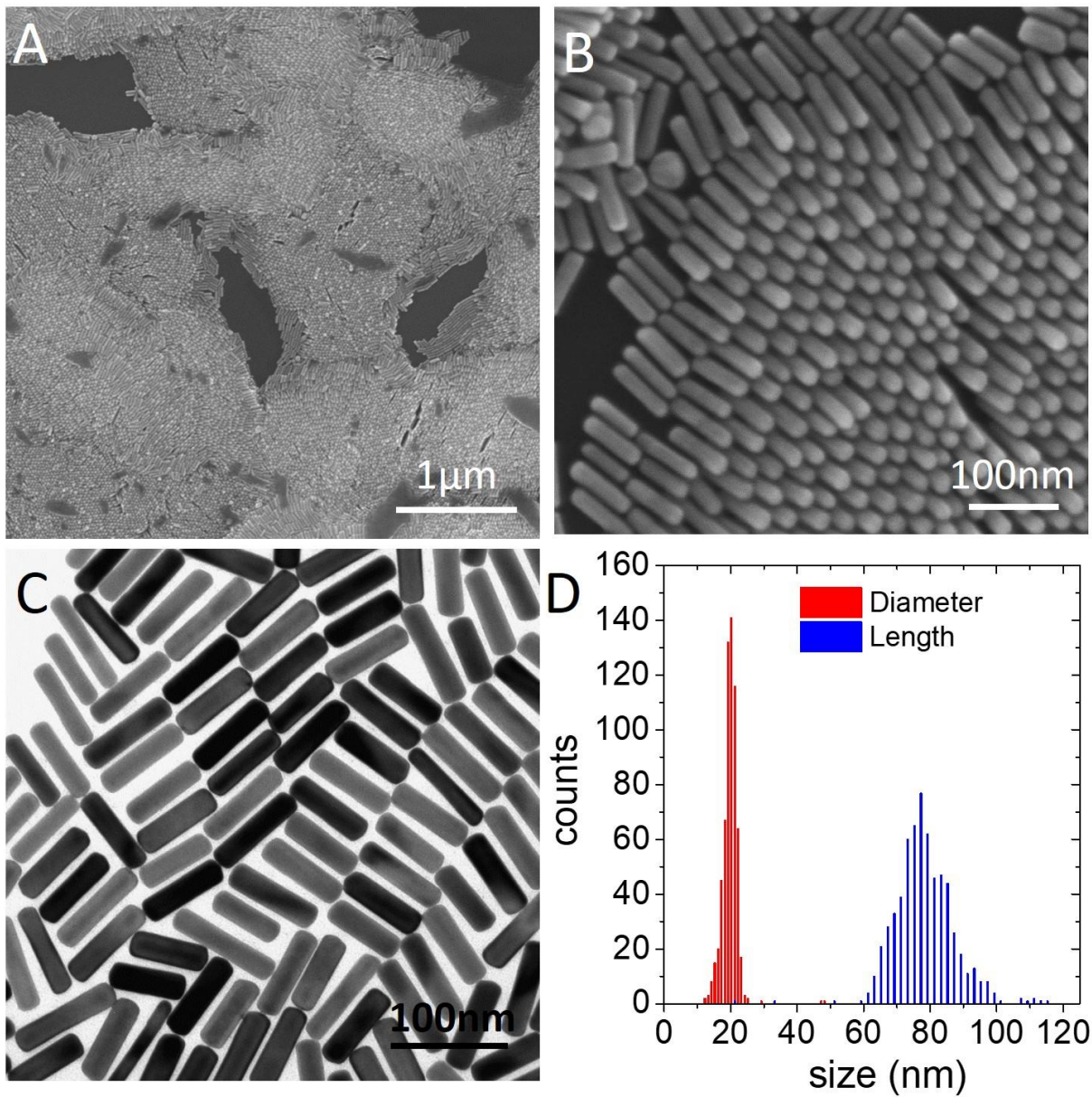


Figure S3: Gold NRs issued from sample NR#3: (A) SEM and (B) HRSEM images of NRs self-organized on a Si wafer. (C) TEM image showing single domain NRs. (D) Diameter and length distributions.

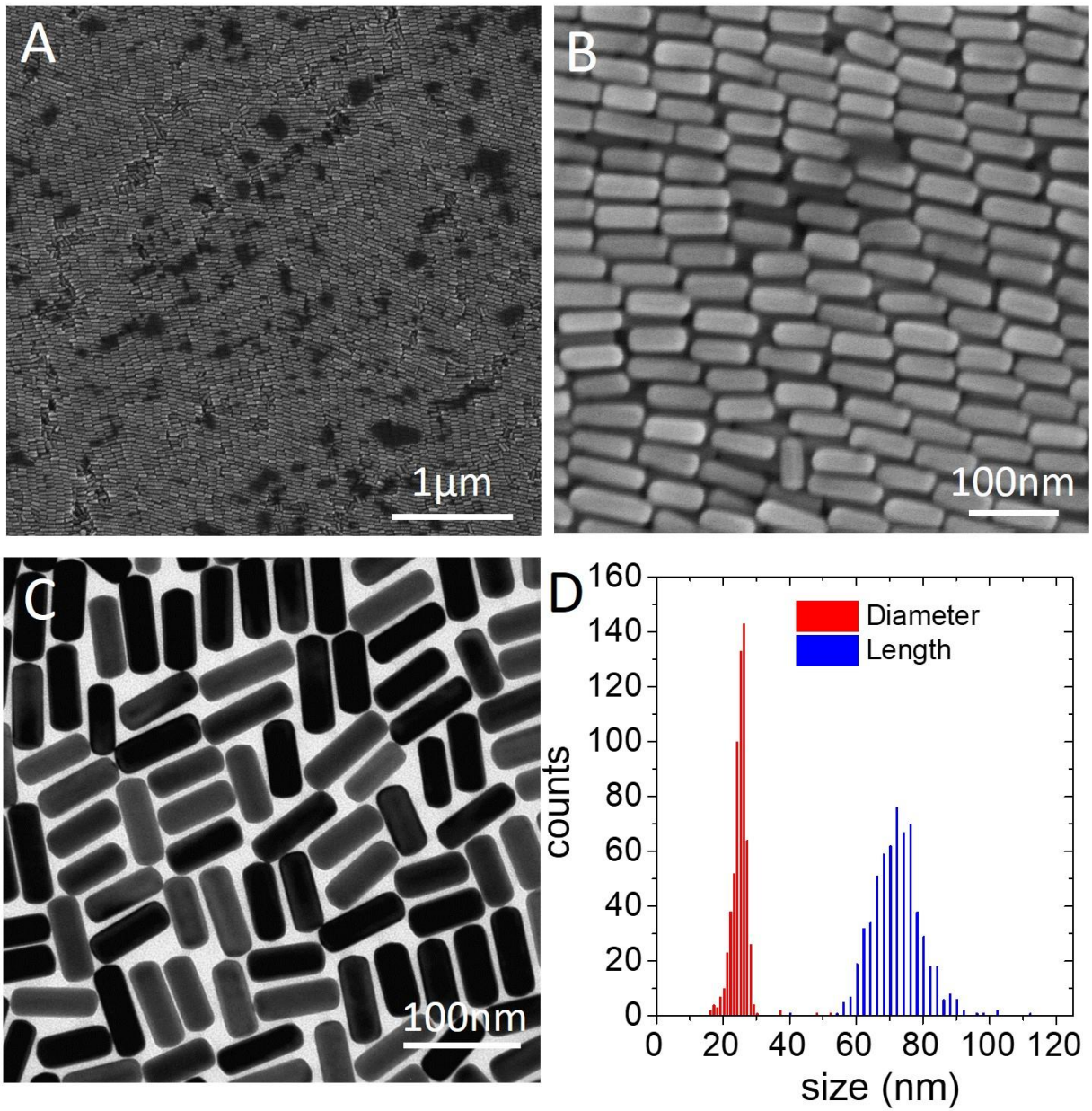


Figure S4: Gold NRs issued from sample NR#4: (A) SEM and (B) HRSEM images of NRs self-organized on a Si wafer. (C) TEM image showing single domain NRs. (D) Diameter and length distributions.

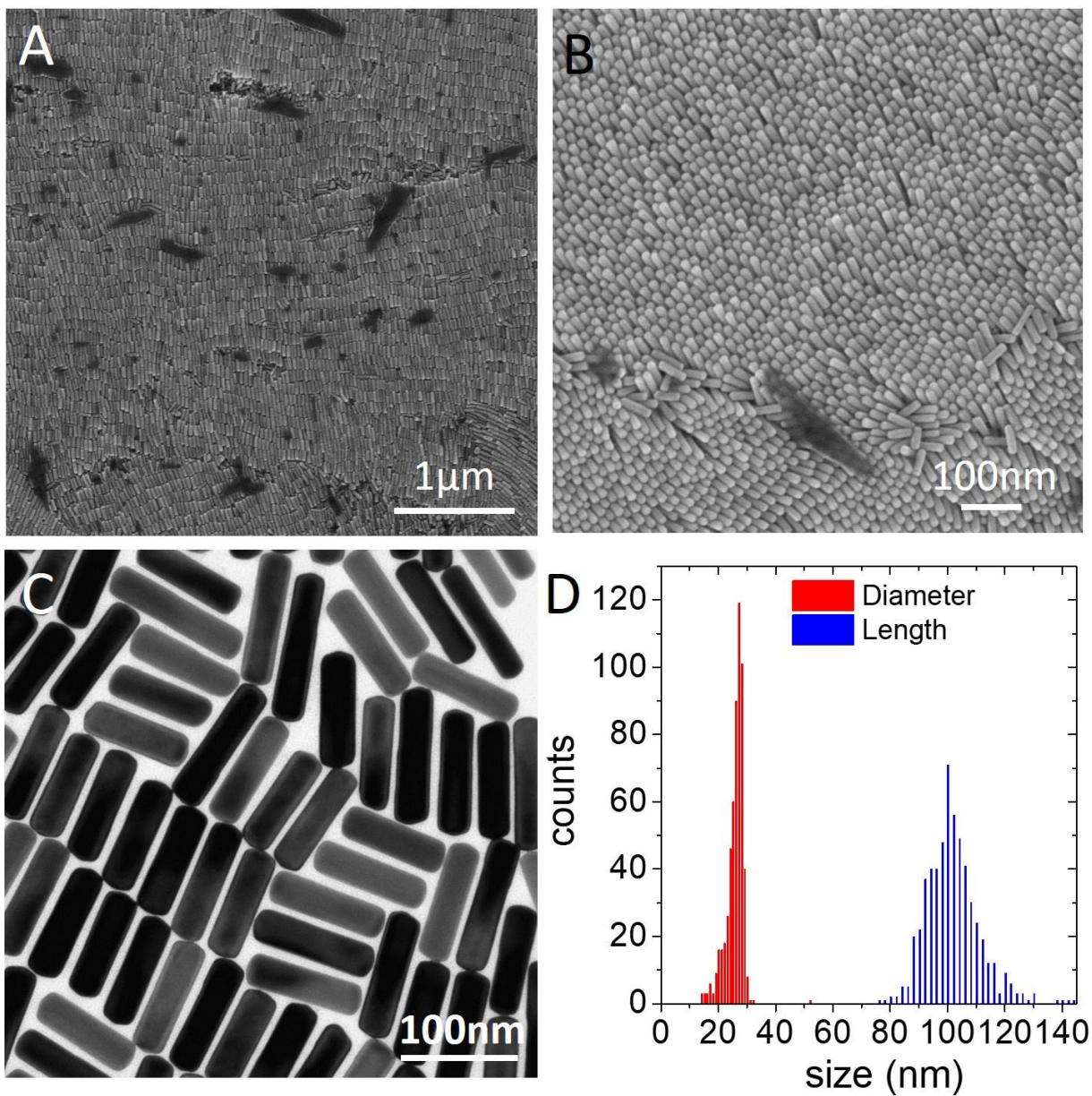


Figure S5: Gold NRs issued from sample NR#5: (A) SEM and (B) HRSEM images of NRs self-organized on a Si wafer. (C) TEM image showing single domain NRs. (D) Diameter and length distributions.

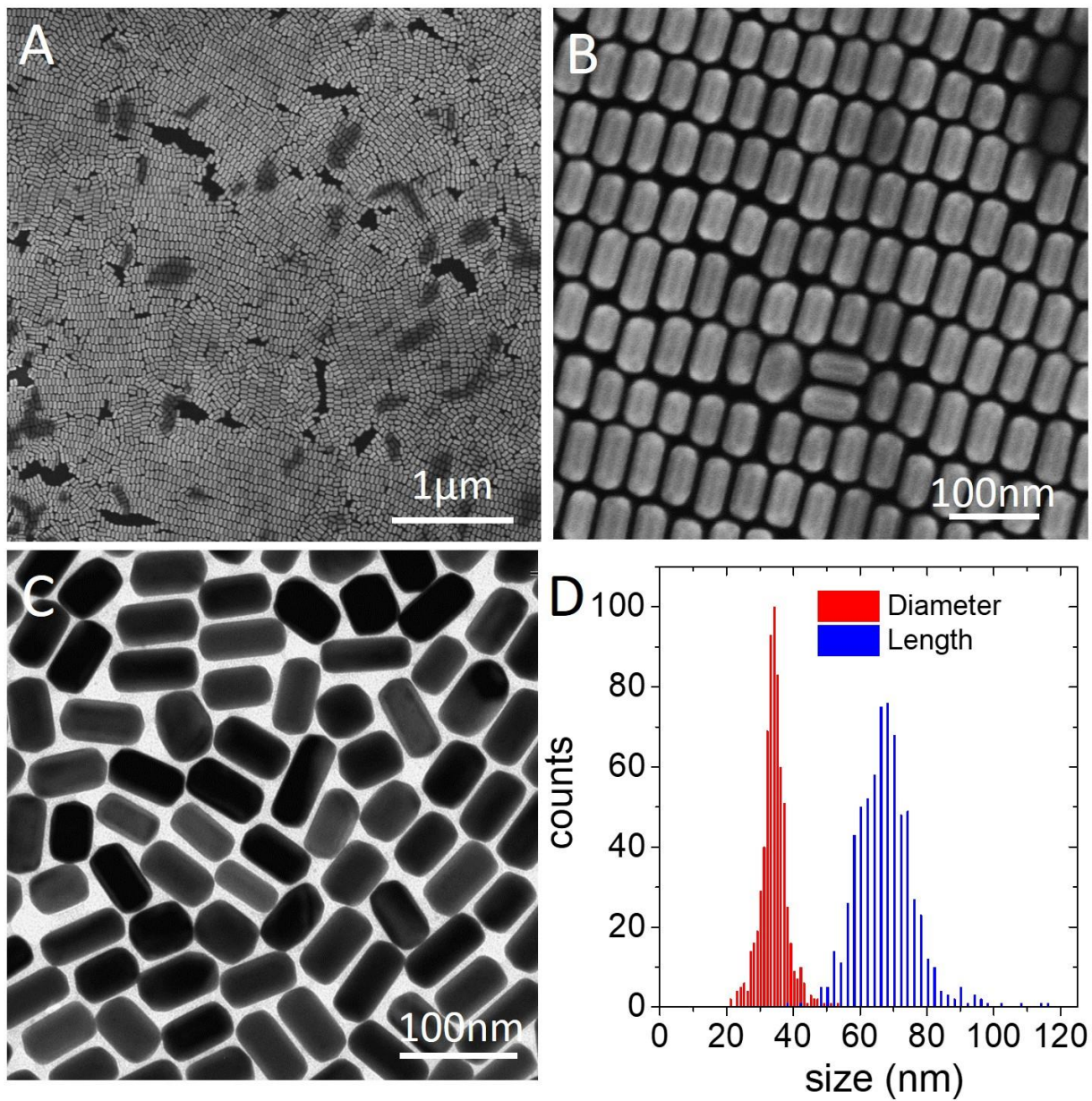


Figure S6: Gold NRs issued from sample NR#6: (A) SEM and (B) HRSEM images of NRs self-organized on a Si wafer. (C) TEM image showing single domain NRs. (D) Diameter and length distributions.

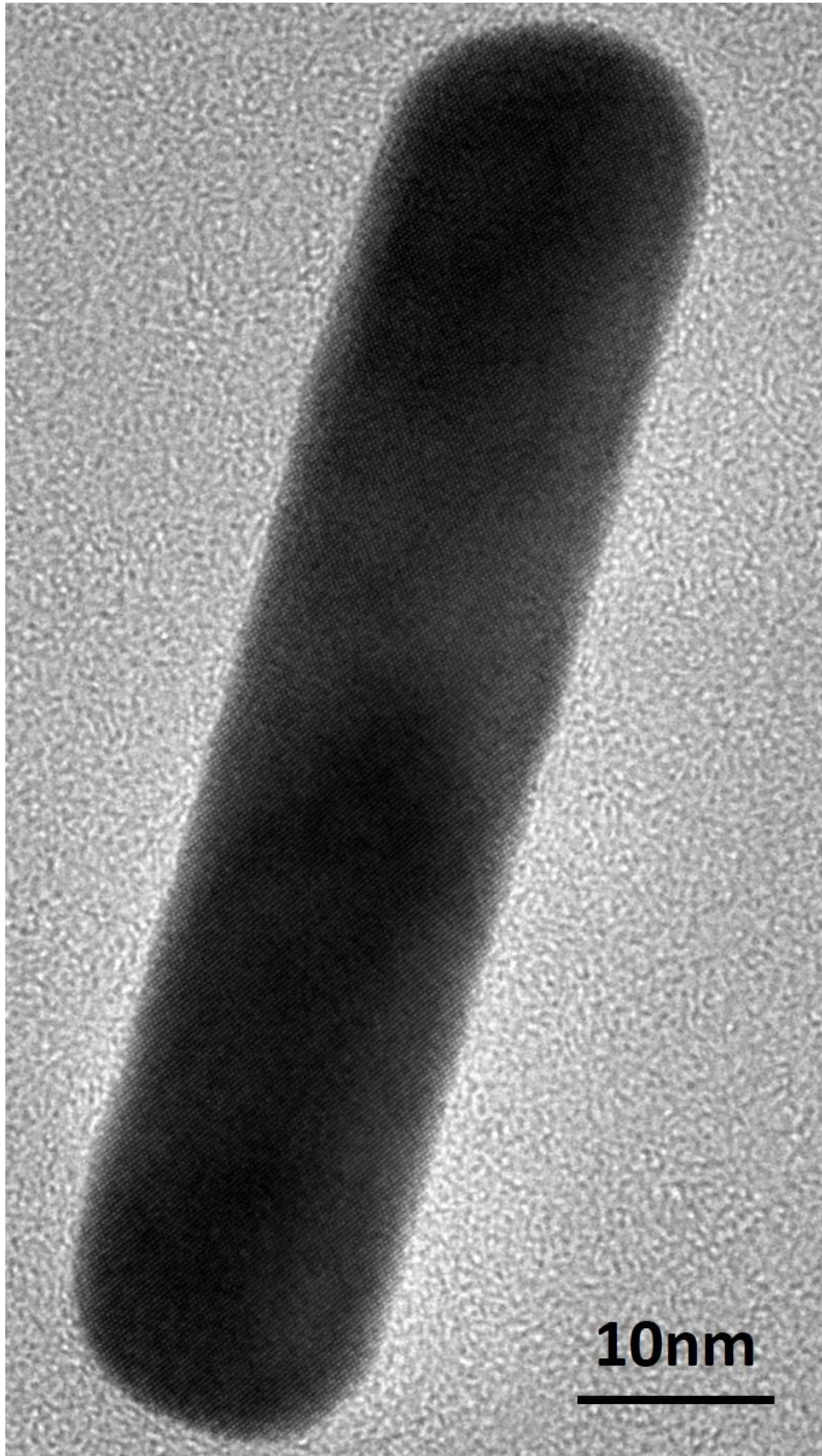


Figure S7: HRTEM image of one single domain Au NR.

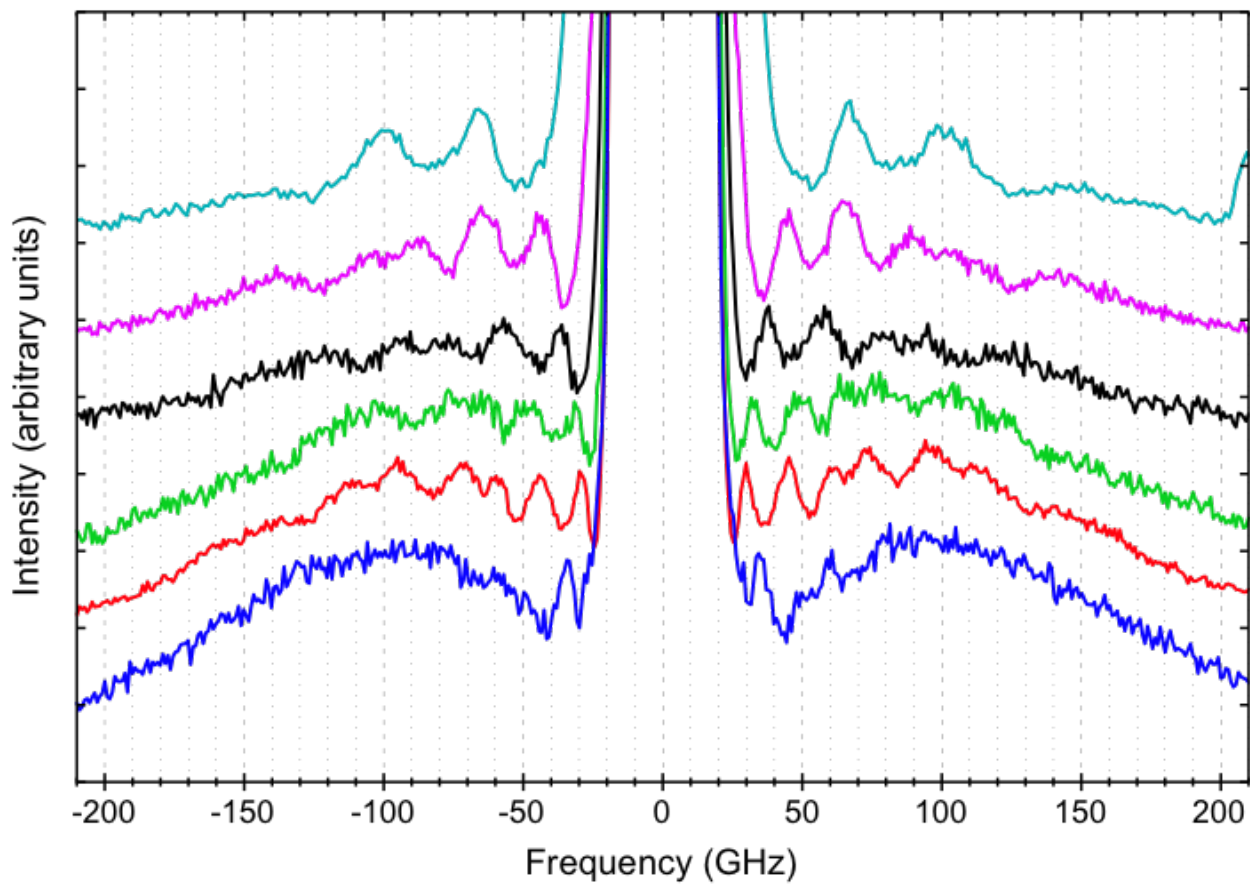


Figure S8: Stokes and anti-Stokes low-frequency inelastic light scattering spectra of Au NRs with different sizes and aspect ratios. From top to bottom, the spectra of samples NR# i ($i=1-6$) are plotted. The spectra are independently scaled and vertically shifted for clarity.

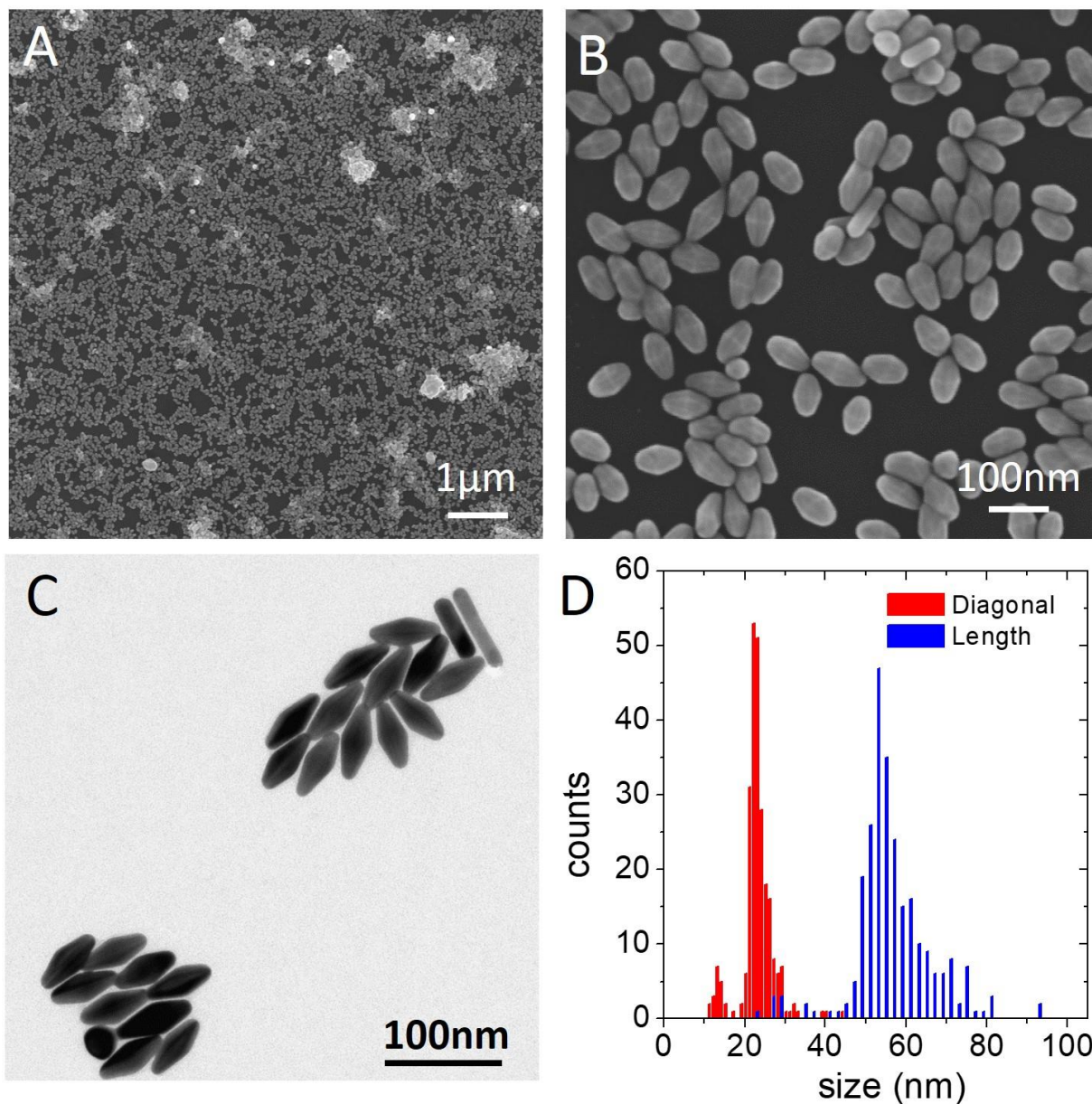


Figure S9: Gold nanobipyramids (NBPs) issued from sample NBP#1: (A) SEM and (B) HRSEM images of NBPs deposited onto a Si wafer. (C) TEM image showing multiply-twinned NBPs along with few nanoparticles of different shapes (spheroids, NRs). (D) Diagonal and length distributions.

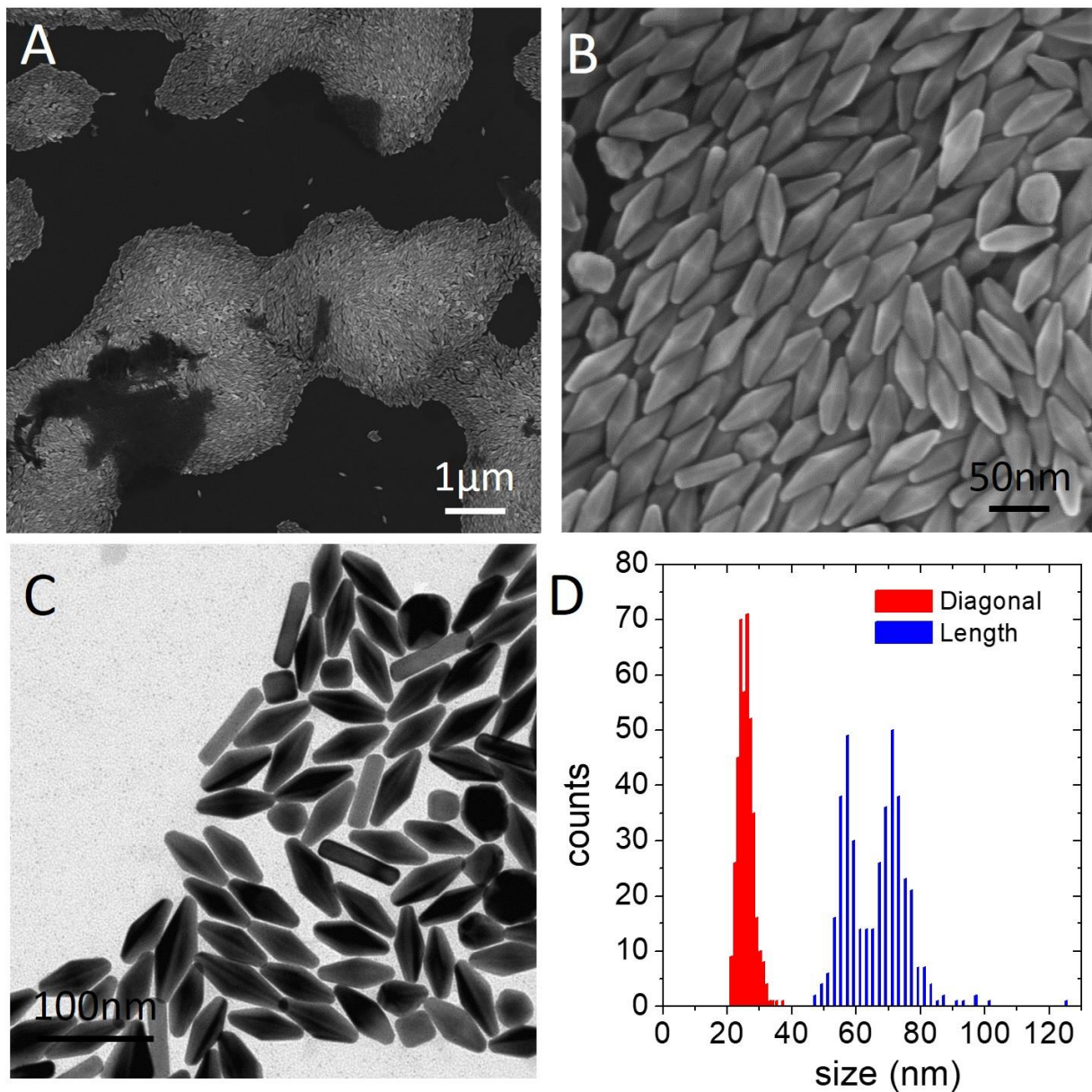


Figure S10: Gold NBPs issued from sample NBP#2: (A) SEM and (B) HRSEM images of NBPs deposited onto a Si wafer. (C) TEM image showing multiply-twinned NBPs along with few nanoparticles of different shapes (spheroids, NRs). (D) Diagonal and length distributions.

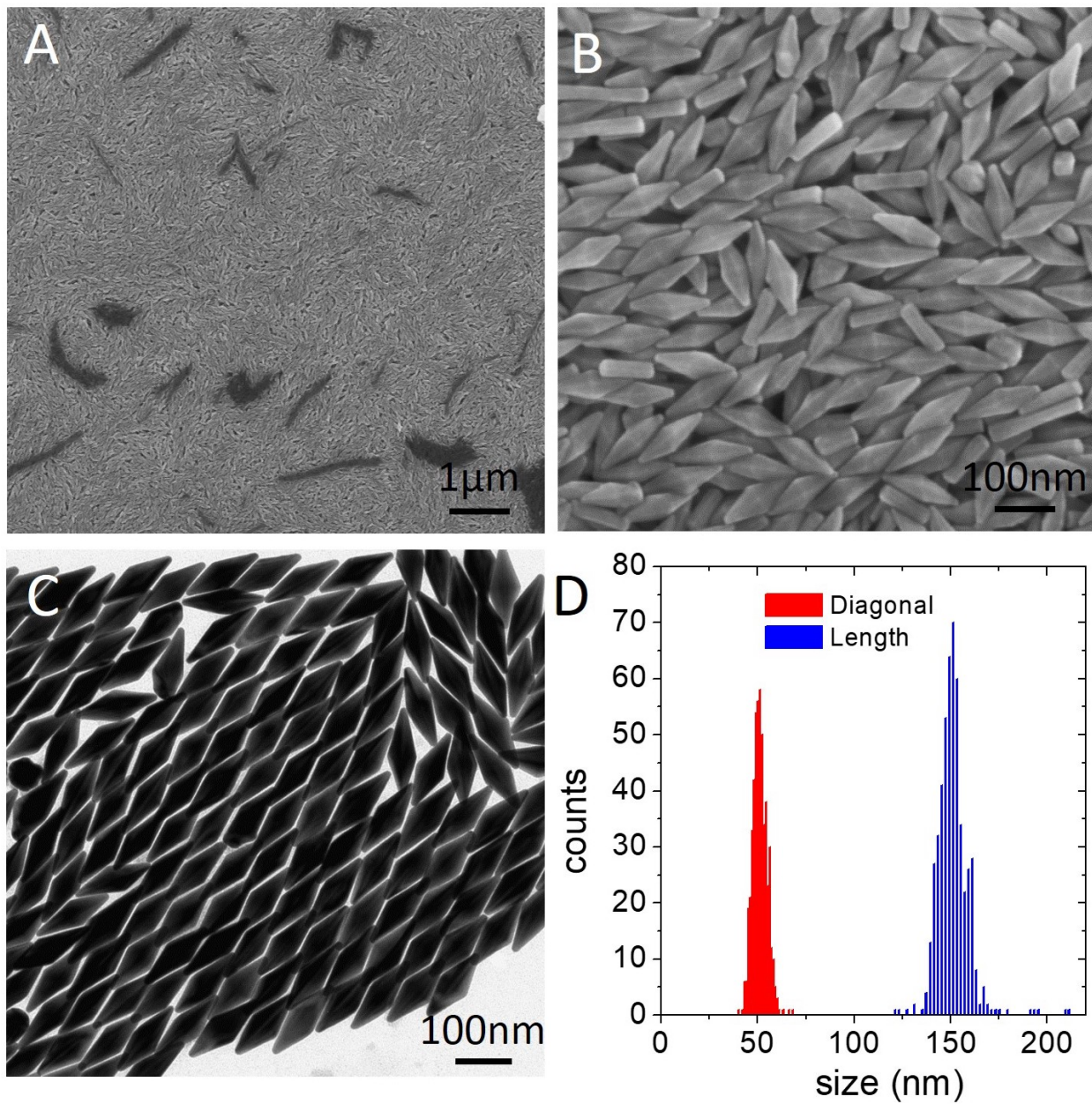


Figure S11: Gold NBPs issued from sample NBP #3: (A) SEM and (B) HRSEM images of NBPs deposited onto a Si wafer. (C) TEM image showing multiply-twinned NBPs along with few nanoparticles of different shapes (spheroids, NRs). (D) Diagonal and length distributions.

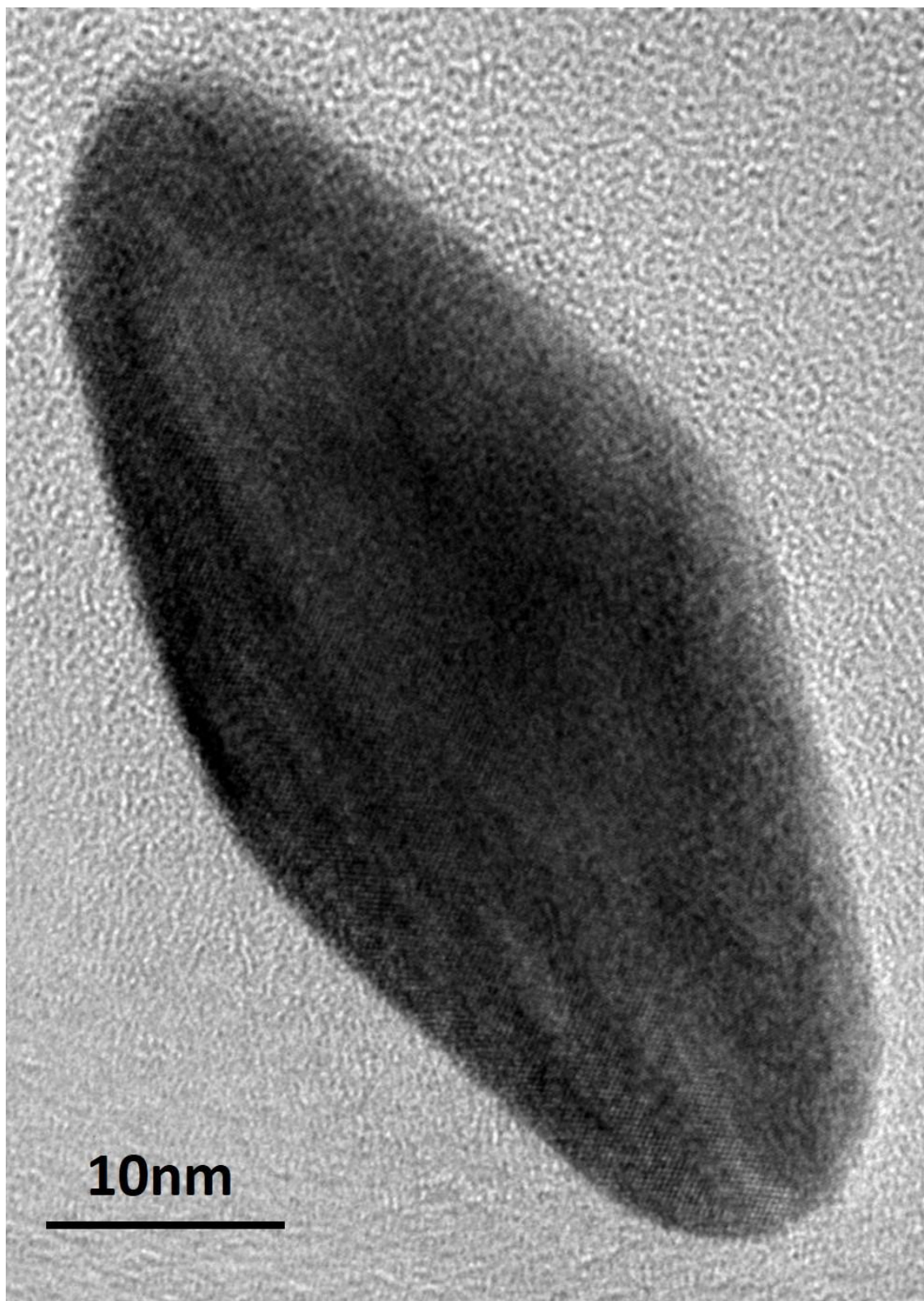


Figure S12: HRTEM image of one multiply-twinned Au NBP.

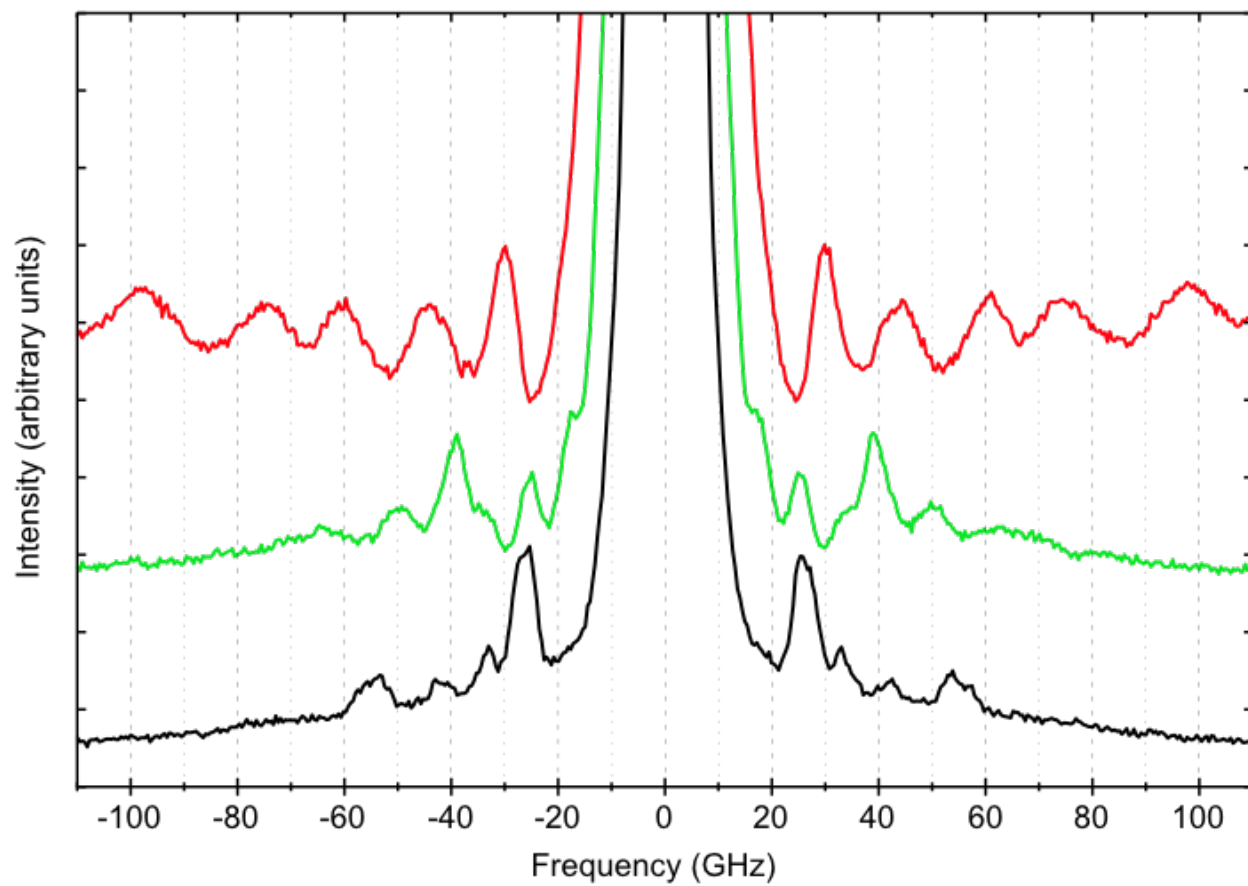


Figure S13: Stokes and anti-Stokes low-frequency inelastic light scattering spectra of Au NBPs with different sizes. From bottom to top, the spectra of samples NBP# i ($i=1-3$) are plotted. The spectra are independently scaled and vertically shifted for clarity.

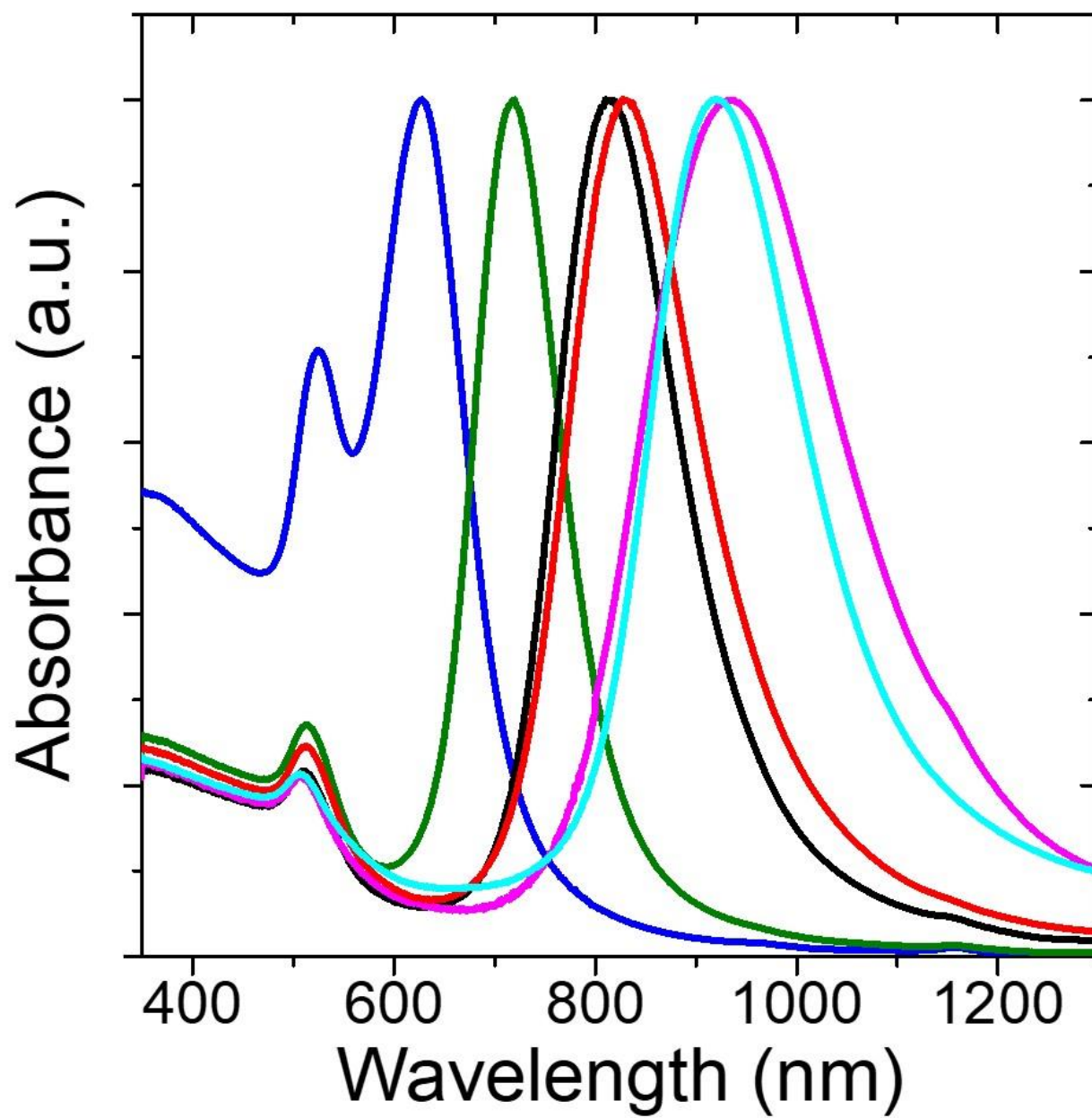


Figure S14: Visible-NIR absorption spectra of colloidal solutions of Au NRs used to prepare the following samples: NR#1 (cyan curve), NR#2 (violet curve), NR#3 (black curve), NR#4 (green curve), NR#5 (red curve) and NR#6 (blue curve).

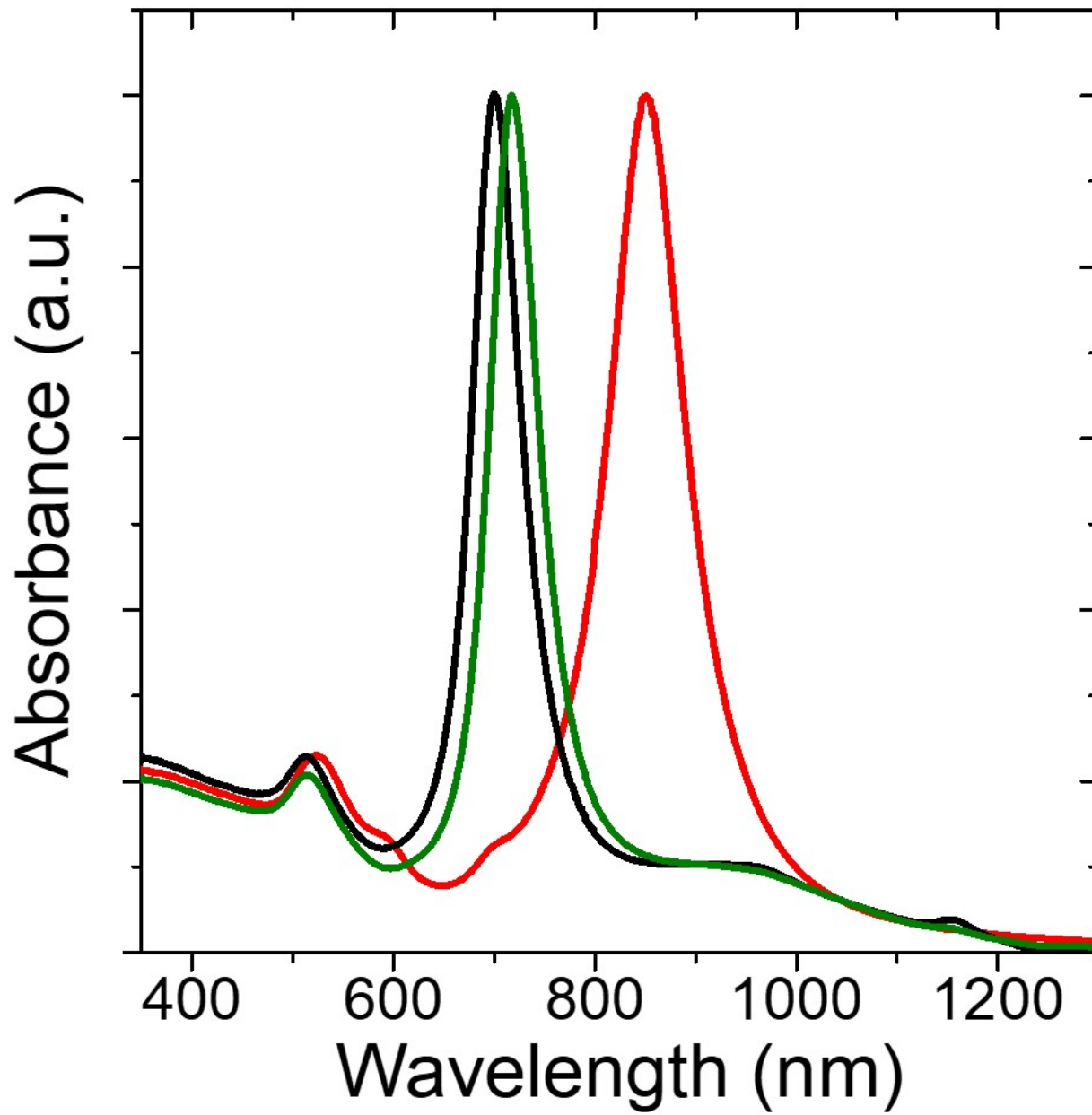


Figure S15: Visible-NIR absorption spectra of colloidal solutions of Au NBPs used to prepare the following samples: NBP#1 (black curve), NBP#2 (green curve) and NBP#3 (red curve).

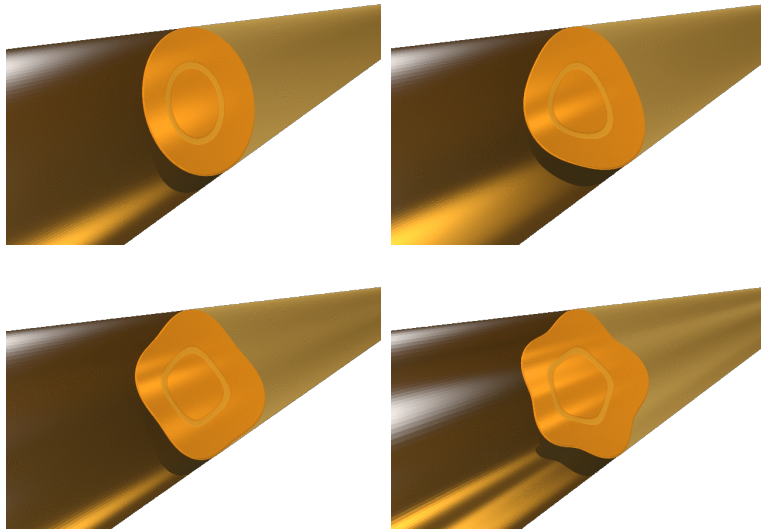


Figure S16: Frames of the animations of the vibrations of an isotropic Au nanowire which are shown in files 2.mp4, 3.mp4, 4.mp4 and 5.mp4. They correspond to the fundamental zone center ($q = 0$) $m = 2, 3, 4$ and 5 modes similar to the spheroidal modes of the sphere with the same ℓ . The nanowires are semi-transparent on one side. The displacement of a cross-section is shown. An inner ring is also plotted on the cross-section to visualize the displacement inside the nanowire.