

Supplementary Information (SI)

Seeded Growth Induced Amorphous to Crystalline Transformation of Niobium Oxide Nanostructures

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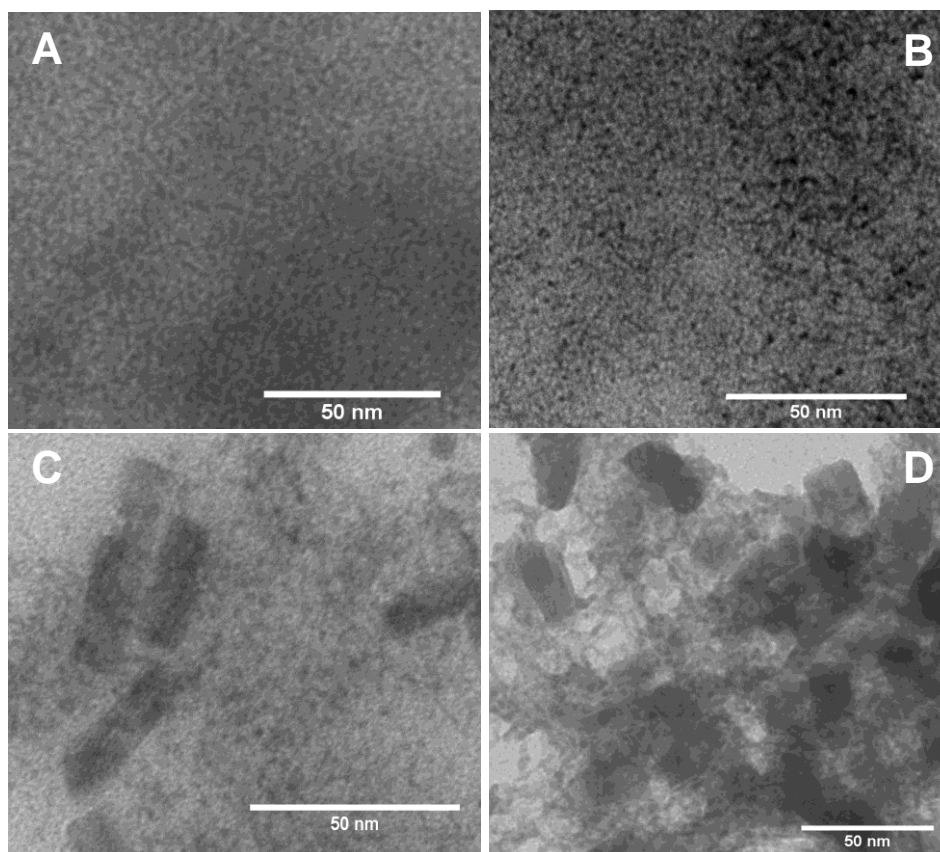


Figure S1. Thermal decomposition products of niobium oleate (0.380 g) in 5 mL of squalane, and 0.36 mL oleic acid after 30 minutes at (A) 280, (B) 320, (c) 350, and (D) 400 °C respectively.

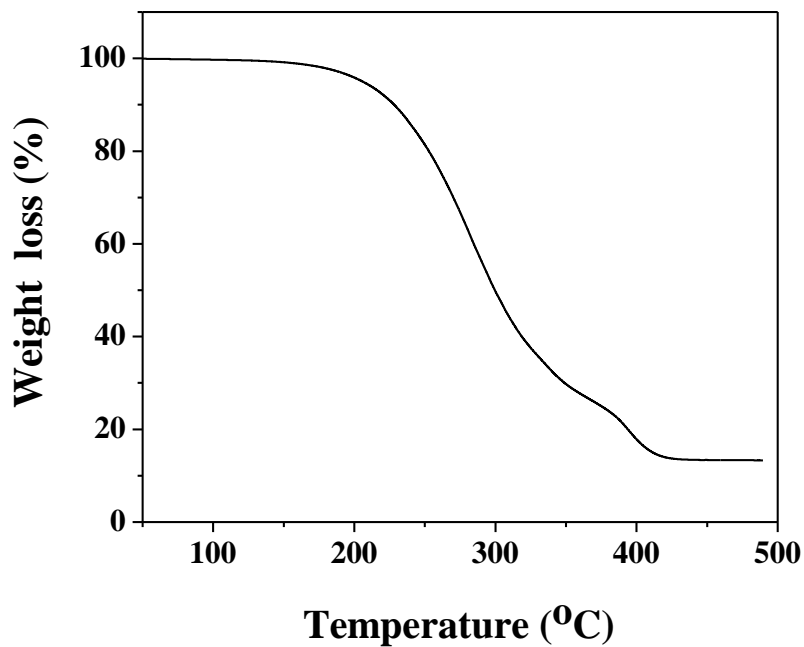


Figure S2. Thermogravimetric analysis (TGA) data of Nb-oleate precursor measured in nitrogen from room temperature to 500°C. The remaining weight after 500°C was in agreement with the ceramic yield expected for Nb₂O₅. The thermogravimetric data demonstrates that Nb-oleate begins to decompose at ~220-280°C.

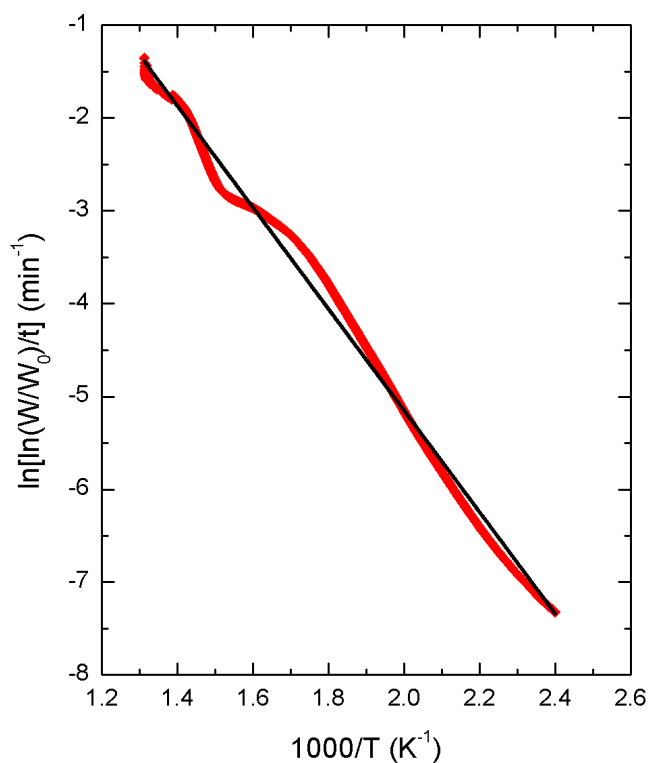


Figure S3. Apparent activation energy for the assumed first-order decomposition of Nb-oleate in N₂. The measured apparent activation energy for decomposition was determined to be 45.4 kJ mol⁻¹. This measurement was conducted in an inert, gaseous atmosphere (N₂) which approximates the high-temperature solution-phase employed during synthesis. Solvation effects are most likely minor at the elevated temperatures used in these syntheses.

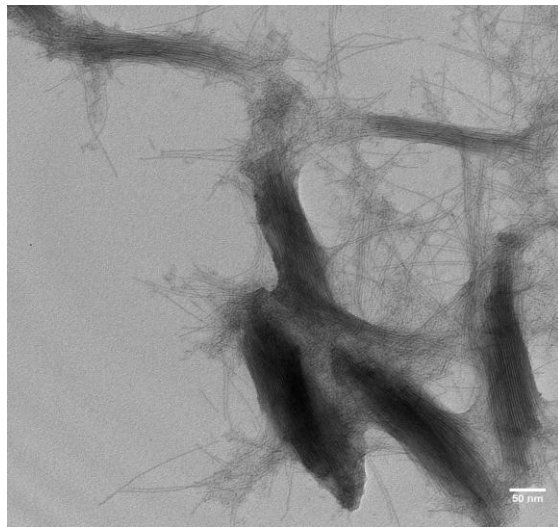


Figure S4. TEM image of niobium oxide bundled nanowires after 2 h of sonication. Sonication is unable to break the bundle apart into individual nanowires. Scale bar is 50 nm.

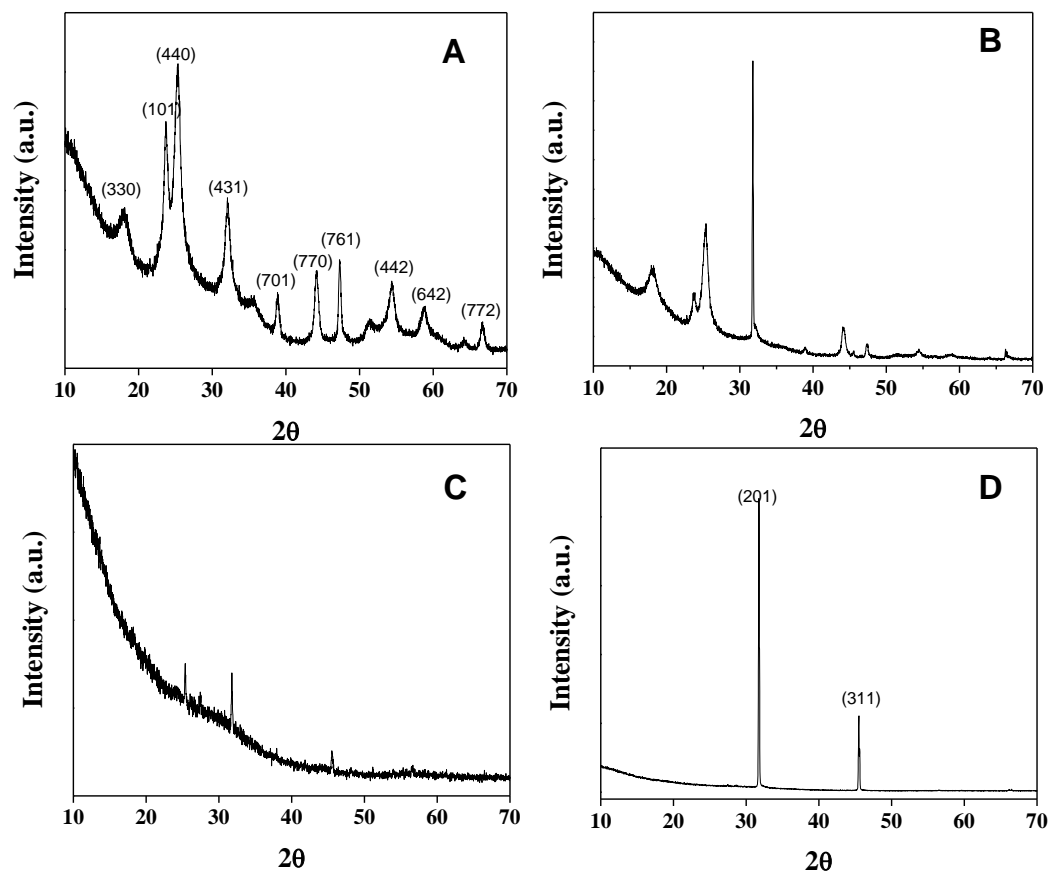


Figure S5. XRD patterns of niobium oxide nanostructures obtained by seeded growth at (A) 380, (B) 350, (C) 320, and (D) 300°C respectively.

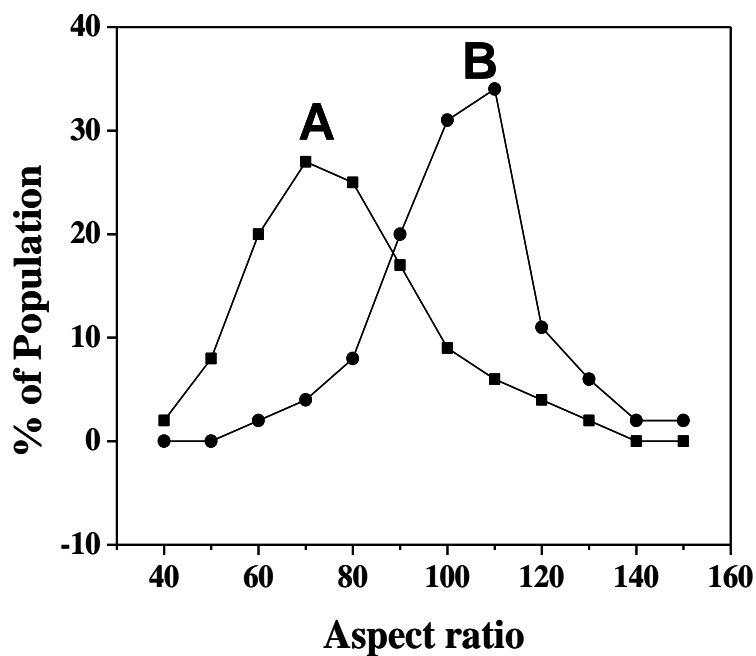


Figure S6. Percentage of population of nanowires (100 individuals measured) versus their aspect ratio obtained after the injection of 0.1 mmol Nb-oleate (A) once and (B) twice at 300°C. The corresponding nanoparticles are shown in Fig. 4.

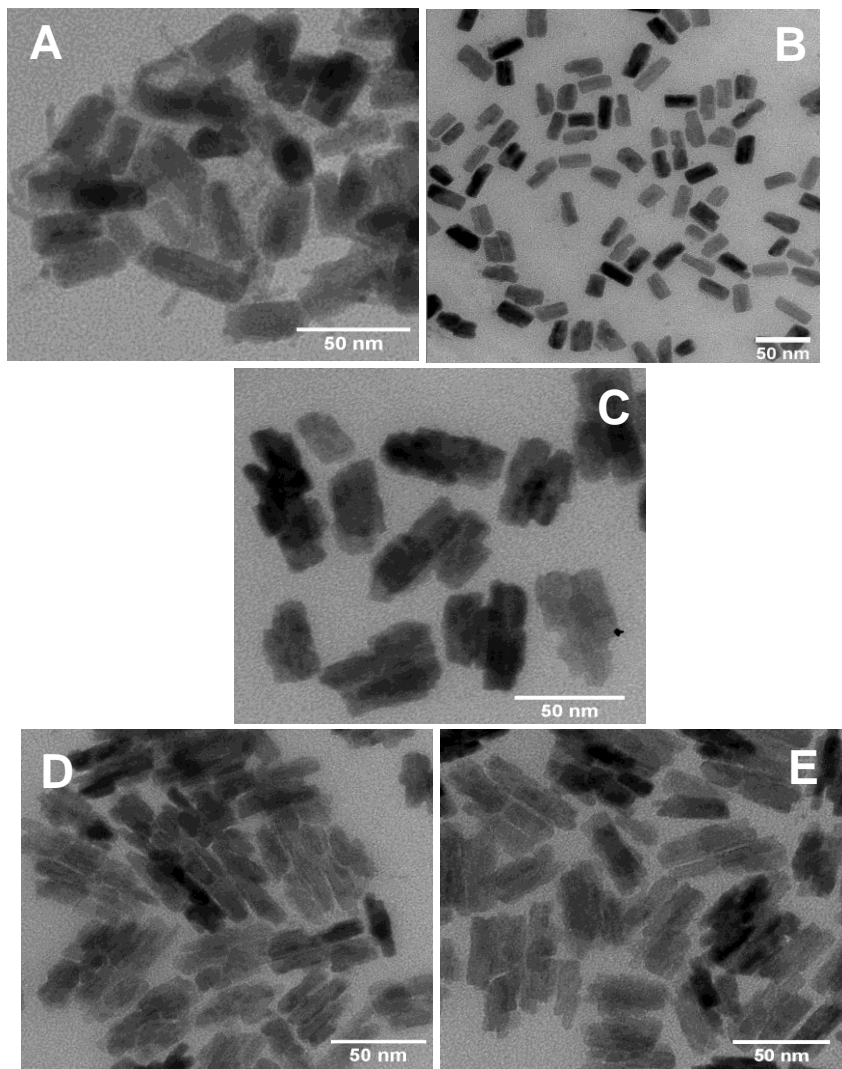


Figure S7. TEM images of the particles obtained after the injection of different concentration of niobium oleate solution into the reaction mixture at 380°C; (A) 0.05, (B) 0.10, (C) 0.15, (D) 0.20, and (E) 0.25 mmol.

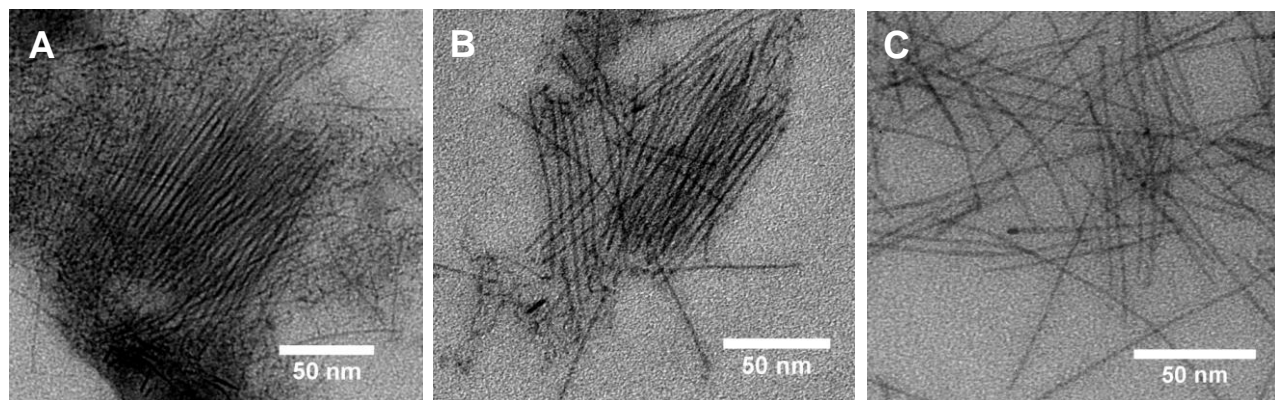


Figure S8. TEM images of the time-dependent evolution of nanowires from the initial amorphous material after injection of 0.1 mmol Nb-oleate at 300°C; (A) 10, (B) 15, and (C) 30 minutes, respectively.

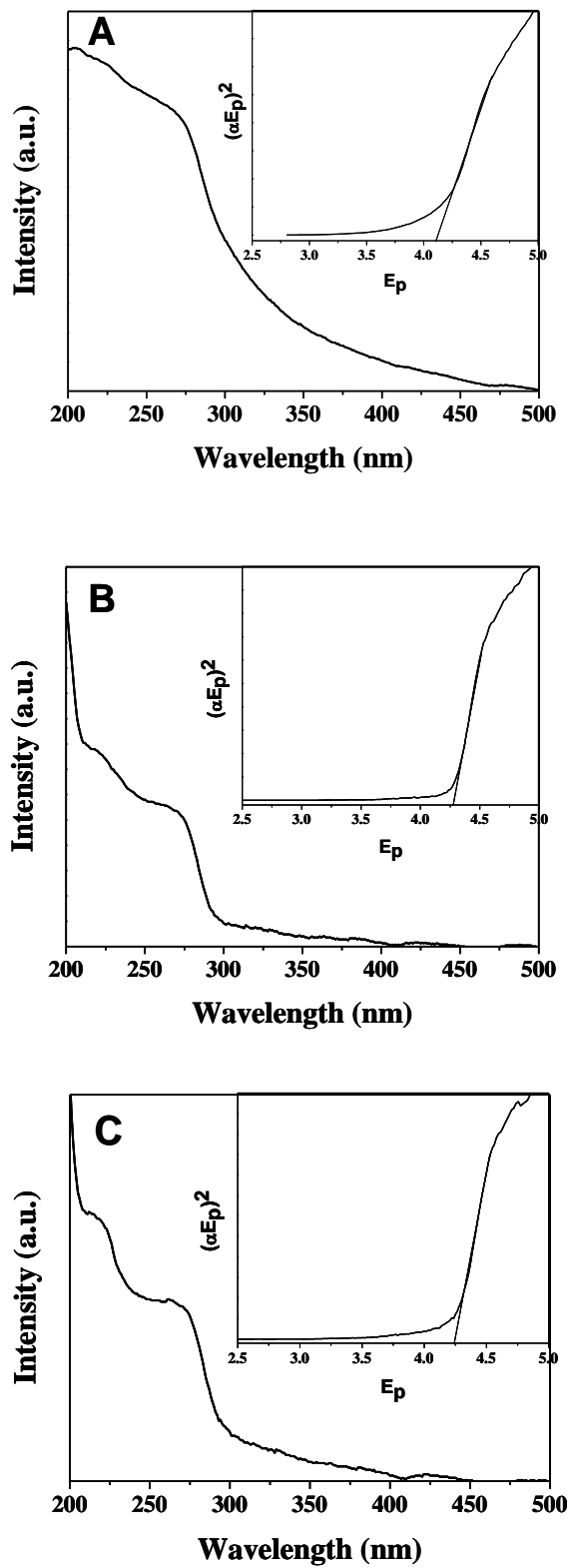


Figure S9. UV-Visible absorption spectra of (A) nanoplatelets, (B) nanowires, and (C) bundled nanowires. Insets show the corresponding E_p vs. $(\alpha E_p)^2$ curve.