

Supplementary Data for

Enhanced formation of PbSe nanorods via combined solution-solid-liquid growth and oriented attachment

Min-Seok Kim^a and Yun-Mo Sung^{*a}

^a Department of Materials Science and Engineering, Korea University, Seoul 136-713, South Korea

Details of the synthesis procedure of Bi nanoparticles

All chemicals except for PHD-co-PVP were purchased from Sigma-Aldrich and Bi nanoparticles were synthesized by a previously reported Buhro et al.'s procedure.¹ 71 mg of bismuth (III) chloride (BiCl₃, ≥98%) was loaded in a 100 mL three-neck flask with a stirring bar. 500 mg of tetrahydrofuran (THF, anhydrous, ≥ 99.9%, contains 250 ppm BHT as inhibitor) was then loaded, followed by substantial shaking to obtain a near homogeneous, but slightly milky, suspension. Poly(1-vinylpyrrolidone)-graft-(1-hexadecene) (PHD-co-PVP, CAS No. 63231-81-2) was provided by ISP Technologies, Inc. 25 wt% PHD-co-PVP solution was made by mixing PHD-co-PVP and 1-octadecene (ODE, ≥95.0%). The 25wt% PHD-co-PVP-ODE solution (5 g) was subsequently loaded into the three-neck flask with vigorous stirring. And 270 mg of sodium bis(trimethylsilyl)amide (N(SiMe₃)₂, 95%) was loaded next, with shaking to generate a dark-red solution. The three-neck flask was heated to 200 °C with stirring and this temperature was maintained for 24 hrs. The final product was purified using a mixture of ethanol and toluene. After several purification steps, Bi nanoparticles were redispersed in 40 mL of TOP and 40 mL of toluene for the synthesis PbSe nanorods and TEM analysis, respectively. All reaction steps were performed under argon gas flowing. The phase and crystallinity of the samples was investigating using

XRD. HRTEM images were used to examine the morphologies and crystallinity. EDS data was employed to identify the specific elements.

Reference

1. F. D. Wang and W. E. Buhro, *Small* 2010, **6**, 573.

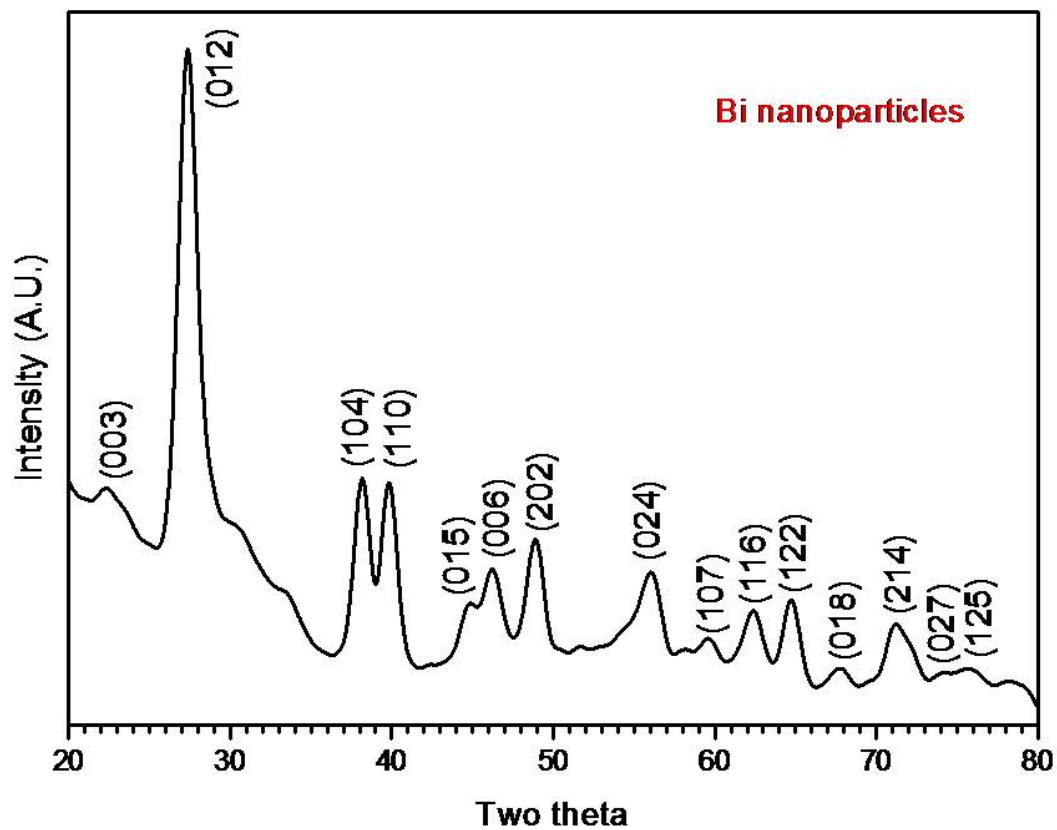


Fig. S1. XRD data of Bi nanoparticles

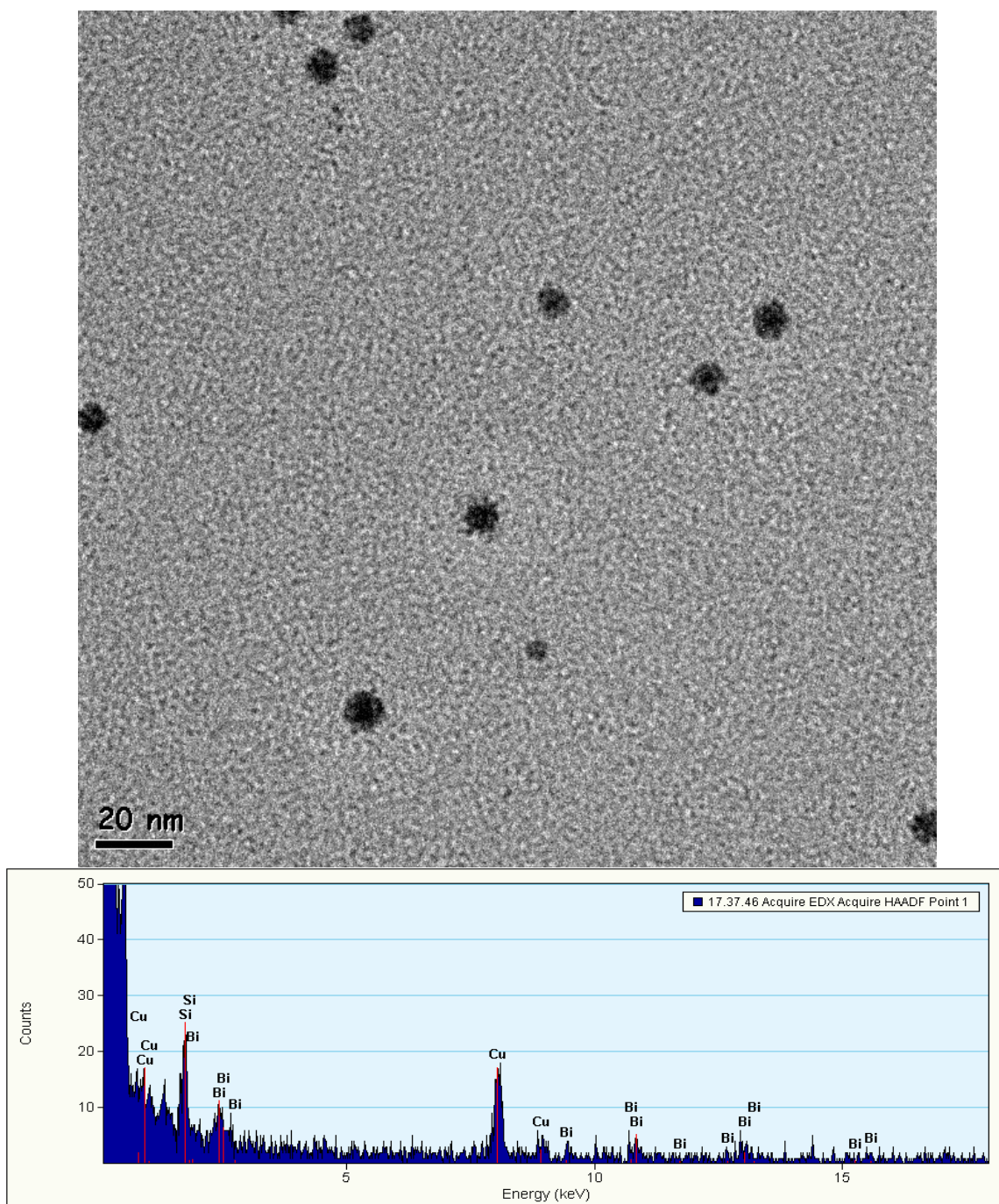


Fig. S2. High resolution TEM images and EDS data of Bi nanoparticles

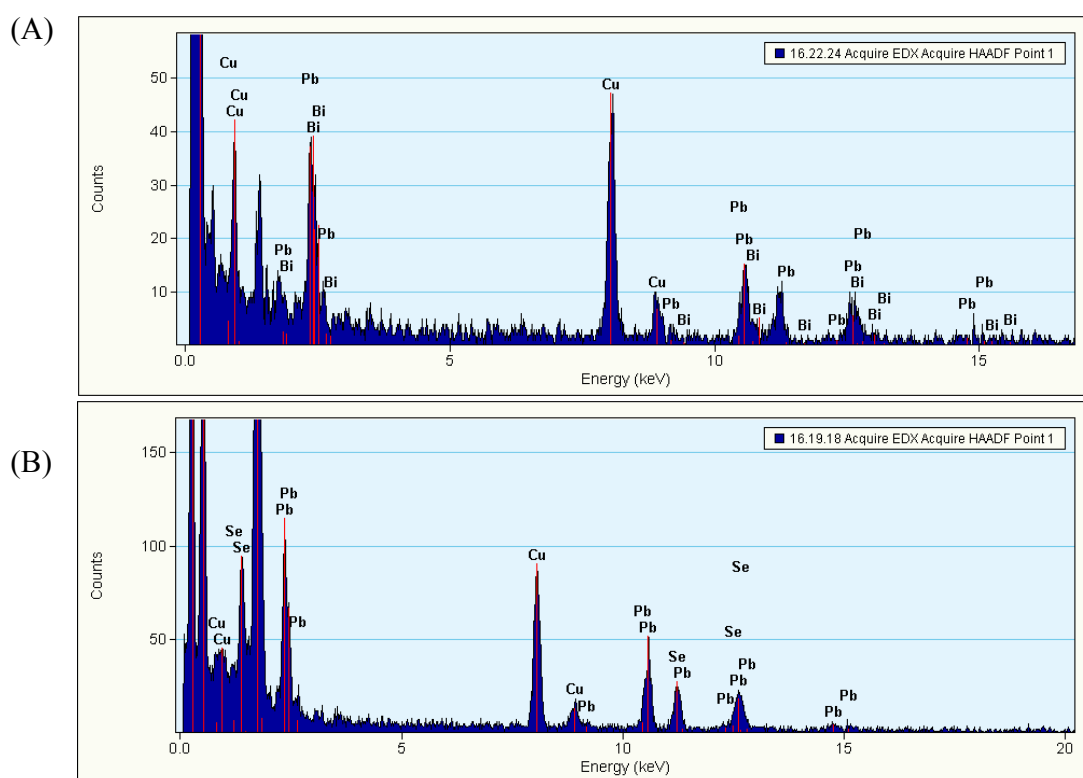
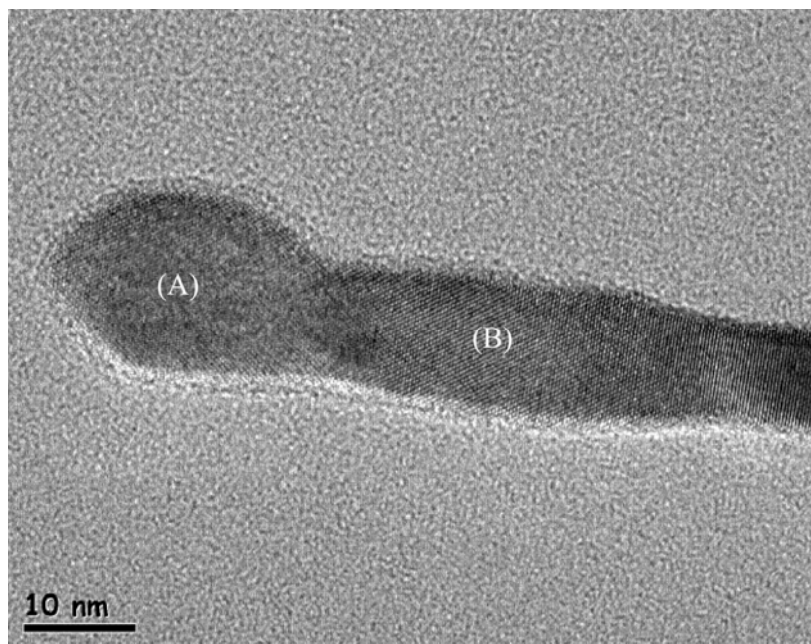


Fig. S3. High resolution TEM image and EDS data of PbSe nanorods. (A) and (B) correspond to the Bi tip and PbSe nanorod, respectively.

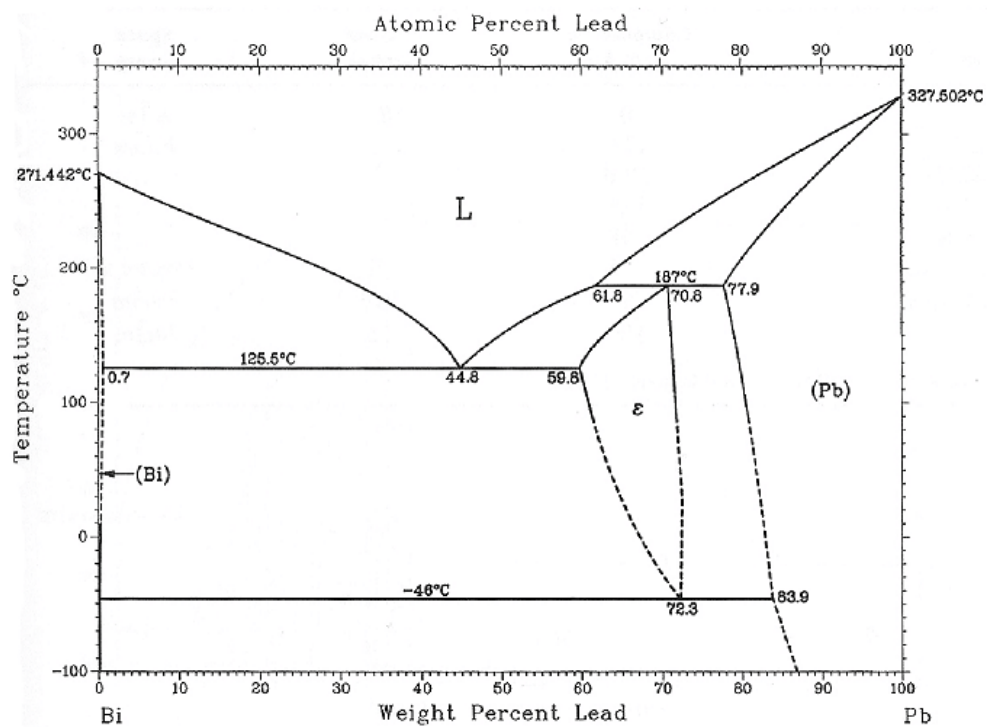


Fig. S4. The phase diagram of lead-bismuth eutectic