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Article

Supplementary Materials: Unexpected Au alloying in tailoring In-doped SnTe nanostructures with gold nanoparticles

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S1. Detection of a tiny GNP in EDX spectroscopy

It is a challenge to identify the detection limit of each element in a range of the dimensions of each object. Au spectrum from a tiny amount of Au in a gold nanoparticle (GNP) were measured using energy dispersive X-ray (EDX). We confirmed that a peak around 2.1 keV in EDX spectra in Figure S1 can be identified as Au, and hence, one ∼20-nm GNP on a Si substrate is detectable using EDX. This successfully indicates that the amount of Au in a ∼20-nm GNP is above the detection limit.

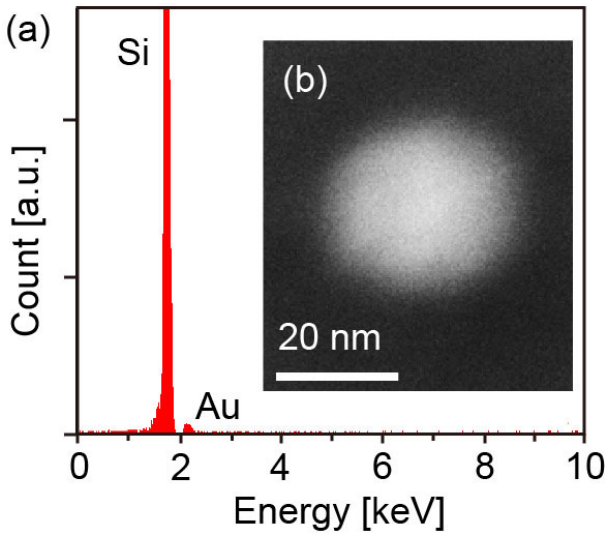

Figure S1. (Color online) Investigation of the detection limit with respect to Au in energy dispersive X-ray (EDX) spectroscopy. (**a**) EDX spectra taken from a point analysis of one ∼20-nm GNP isolated from others on a Si substrate. The inset is (**b**) scanning electron microscope (SEM) topography of a ∼20-nm GNP. Scale bar in (**b**) is 20 nm.

S2. Au alloying with In-doped SnTe in a high-temperature VTG with the use of GNPs

Figure S2 indicates that In-doped SnTe nanostructure grown with a high-temperature VTG method with the use of 20-nm GNPs formed an alloy with Au. It is reassuring that the unexpected feature of Au alloying with In-SnTe is exactly reproduced in two different samples.

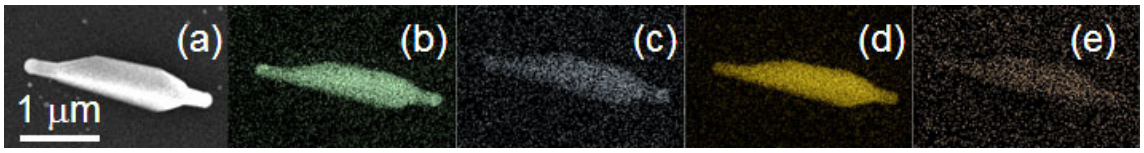

Figure S2. (Color online) Investigation of the constituent elements in the In-SnTe nanostructure grown by the vapor transport growth (VTG) method on a Si substrate under the V-L-S mechanism with the use of 20-nm GNPs demonstrating a reproducibility of Au alloying shown in Figure 3 in the main article. (**a**) Scanning electron microscope topography of a typical nanorod sample. (**b**)-(**e**) Energy dispersive X-ray (EDX) spectroscopy elemental mappings for (**b**) Sn, (**c**) In, (**d**) Te, and (**e**) Au of the sample in (**a**), respectively. Scale bar in (**a**) is 1 μm.

S3. Phase diagram of binary gold alloys; Au-SnTe

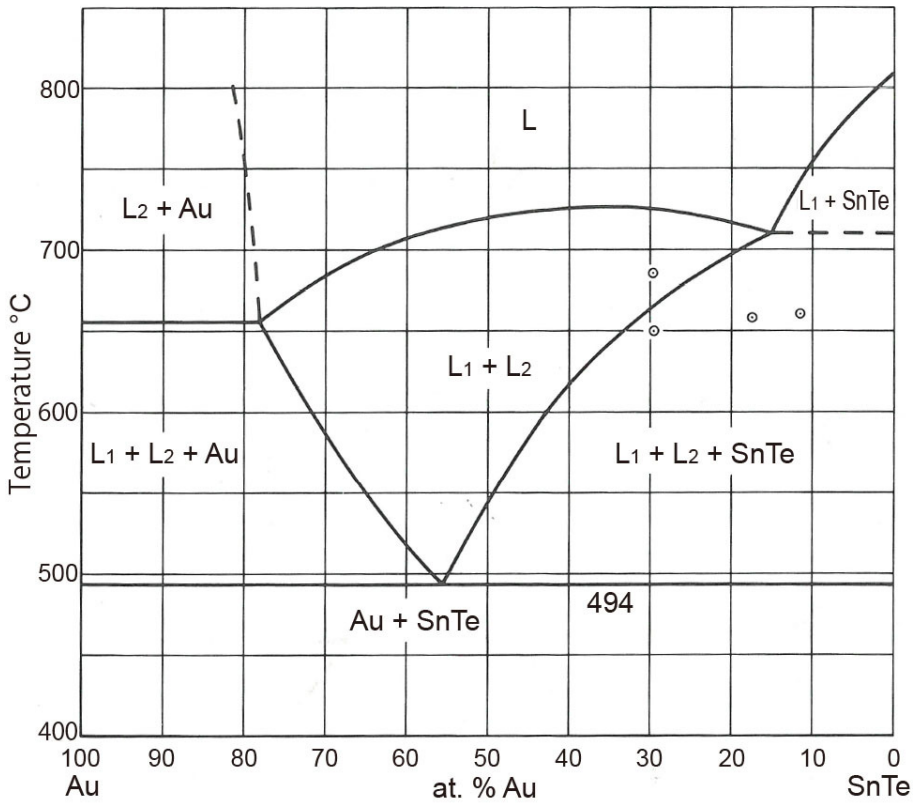

Figure S3. The concentration of Au vs. temperature phase diagram of ternary gold alloys Au-Sn-Te (or more specifically, Au-SnTe) [1]. L_1 and L_2 indicate two different liquid phases with different compositions. It is suggested that L_1 has a composition of 28 atomic percent (at. % or at%) Au, 27 at% Sn, 45 at% Te and L_1 has a composition of 80 at% Au, 18 at% Sn, 2 at% Te in Ref. [1].

References

1. Prince, A.; Raynor, G. V.; Evans, D. S. Ternary systems Au-Sn-Te. In *Phase Diagram of Ternary Gold Alloys*; The Institute of Metals: London, UK, 1990; pp. 456-466; corresponding to Ref. [41] in the main article.