Electronic Supplementary Information

Interfacial transmetallation synthesis of platinadithiolene nanosheet as a potential 2D topological insulator

Tigmansu Pal^a, Shotaro Doi^b, Hiroaki Maeda^a, Keisuke Wada^a, Choon Meng Tan^a, Naoya Fukui^a, Ryota Sakamoto^a, Shinji Tsuneyuki^b, Sono Sasaki^{c,d} and Hiroshi Nishihara^a

^a Department of Chemistry, School of Science, The University of Tokyo, 7-3-1 Hongo, Bunkyo-ku, Tokyo, 113-0033, Japan
^b Department of Physics, School of Science, The University of Tokyo, 7-3-1 Hongo, Bunkyo-ku, Tokyo, 113-0033, Japan
^c Faculty of Fibre Science and Engineering, Kyoto Institute of Technology, Matsugasaki Hashikami-cho 1, Sakyo-ku, Kyoto, 606-8585, Japan.

^d RIKEN SPring-8 Centre, Kouto 1-1-1, Sayo-cho, Sayo-gun, Hyogo, 679-5148, Japan.

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1. Previous reaction schemes and PXRD for PtDT using BHT



Fig. S1. Reaction scheme for interfacial synthesis (a) similar to nickelladithiolene and (b) palladadithiolene CONASHs.



PXRD for Scheme b

Fig. S2. PXRD profiles of product obtained from route b in Fig. S1 (reaction with BHT).

2. IR spectrum of SnBHT compared with BHT



Fig. S3 Comparisons of IR spectra (a) appearance of n-butyl peaks, (b) disappearance of S-H stretching and (c) presence of C=C and C-S in SnBHT and BHT, respectively.

3. XPS comparison between BHT and SnBHT



Fig. S4. S 2s peak of SnBHT (red) compared with BHT (navy blue).

4. Synthesis for SnPtDT



Fig. S5. Experimental setup for free standing SnPtDT.

5. Mechanism in removal of Bu₂SnO



Fig. S6. (a) Optical microscopic image of SnPtDT. (b) AFM image of the exfoliated SnPtDT; height profile marked in (d). (c) TEM image of SnPtDT, (inset) magnified image of the marked area, and both are in scale of 500 nm. (e) Synthetic and plausible mechanistic formation of Bu₂SnO. (f) Substrate reaction to remove agglomerate of Bu₂SnO from PtDT. (g) Optical image after removal of Bu₂SnO.

6. XPS of SnPtDT



Fig. S7. XPspectra of (a) Pt 4f spectra presence of Pt²⁺ in [PtS₄] motif of SnPtDT ^{s4-s7}; (b) Sn 3d compared with SnPtDT (green curve) and SnBHT (red curve); (c) deconvoluted S 2s of SnPtDT, the red curve derived from bis(dithiolato) platinum(II) moities with 0 oxidation state;^{s2} (d) comaparision for the shift of S 2s spectra of SnPtDT (green curve) and SnBHT (red curve); the x-axis for all the graphs corresponds to binding energy in eV.



Fig. S8. XP spectra of SnPtDT showing the presence of Sn (inset)^{54,57}.

7. AFM image of SnPdDT



Fig. S9. AFM images of SnPtDt showing topography image and its cross-sectional analysis.



Fig. S10. IR spectra of PtDT ^{s3}, SnPtDT, and SnBHT.

9. XPS of PtDT after acetic acid treatment of SnPtDT



Fig. S11. (a) and (b) are deconvoluted S 2s and Pt 4f XP spectra of PtDT, respectively ^{s7}.



Fig. S12. XP spectra compared with PtDT and SnPtDT respectively, inset shows disappearance of Sn 3d peaks.

10. Illustrative experimental setup for gas-liquid reaction



Fig. S13. Synthesis of nano-PtDT.

11. AFM image for PtDT



Fig. S14. AFM images of nano-PtDt. (a) AFM topography image. (b) Zoomed image of (a) its cross-sectional analysis in **c** and **d** (with more standing time).

12. Comparison of PXRD pattern



Fig. S15. Comparison with PXRD pattern of eclipsed and staggered conformations.



Fig. S16. (a) and (b) are deconvoluted Pt 4f and I $3d_{5/2}$ XP spectra of PtDT-I, respectively ^[s5-s8].

14. Synthetic scheme and characterization of PtDT-I



Fig. S17. (a) Reaction scheme showing activation of PtDT s2 ; (b) and (c) AFM of PtDT (before) and PtDT-I (after I₂ treatment); (d) Raman spectra of PtDT compared with PtDT-I; (e) height profile of (b) and (c), scale of 20 μ m, respectively.

15. Conductivity of PtDT-I



Fig. S18. Pelletized PtDT-I with attached Au electrodes, and I-V curve measured at room temperature.

16. Appendix

¹H NMR of SnBHT



¹³C NMR of SnBHT



17. References

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