

A new approach to the study of processes of thermal decomposition and formation of nanoalloys: double complex salt $[\text{Pd}(\text{NH}_3)_4][\text{PtCl}_6]$

Tatyana I. Asanova,^{a,*} Igor P. Asanov,^{a,b} Min-Gyu Kim,^c Mihaela Gorgoi,^d Jonas Sottmann,^e

Sergey V. Korenev,^{a,b} Kirill V. Yusenkov^f

^a Nikolaev Institute of Inorganic Chemistry SB RAS, 3, Acad. Lavrentiev Ave., Novosibirsk, Russia

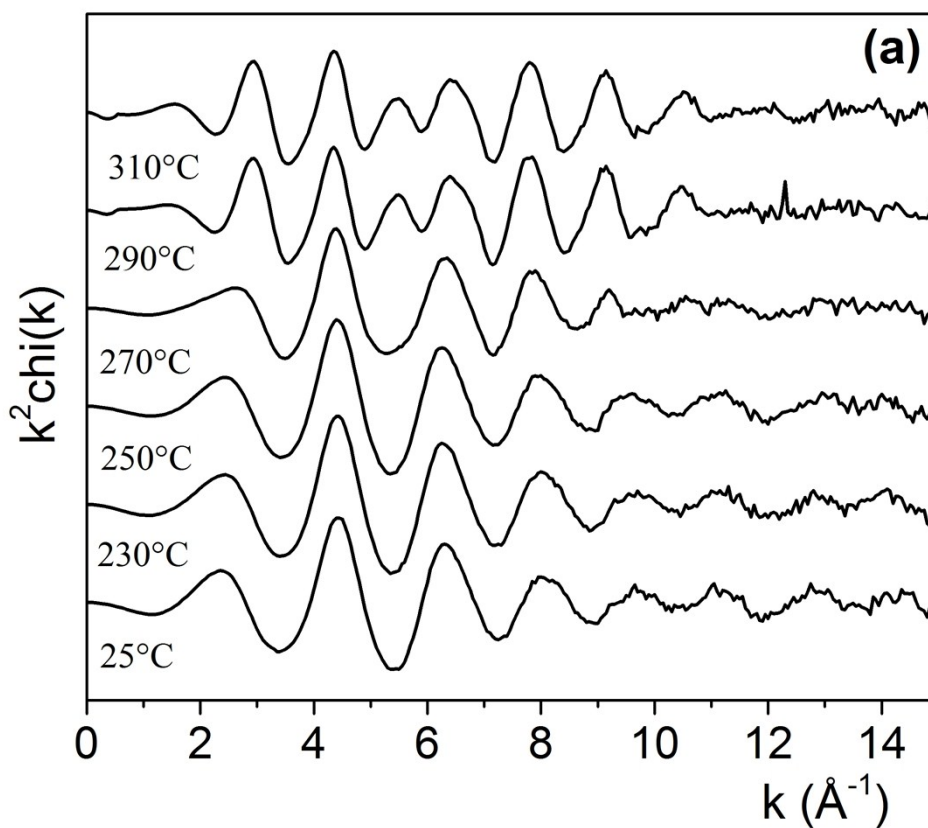
^b Novosibirsk State University, Novosibirsk, 2 Pirogova Str. Novosibirsk, Russia

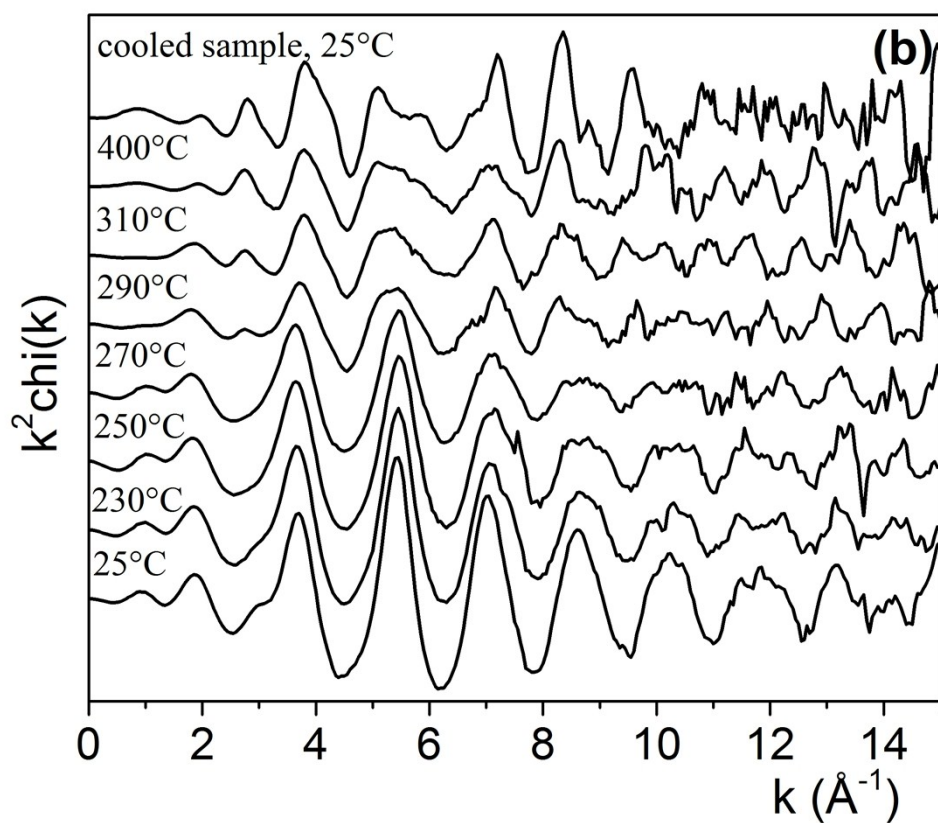
^c Beamline Research Division, Pohang University of Science and Technology, Pohang 790-784, Republic of Korea

^d Helmholtz-Zentrum Berlin für Materialien und Energie, Berlin, Germany

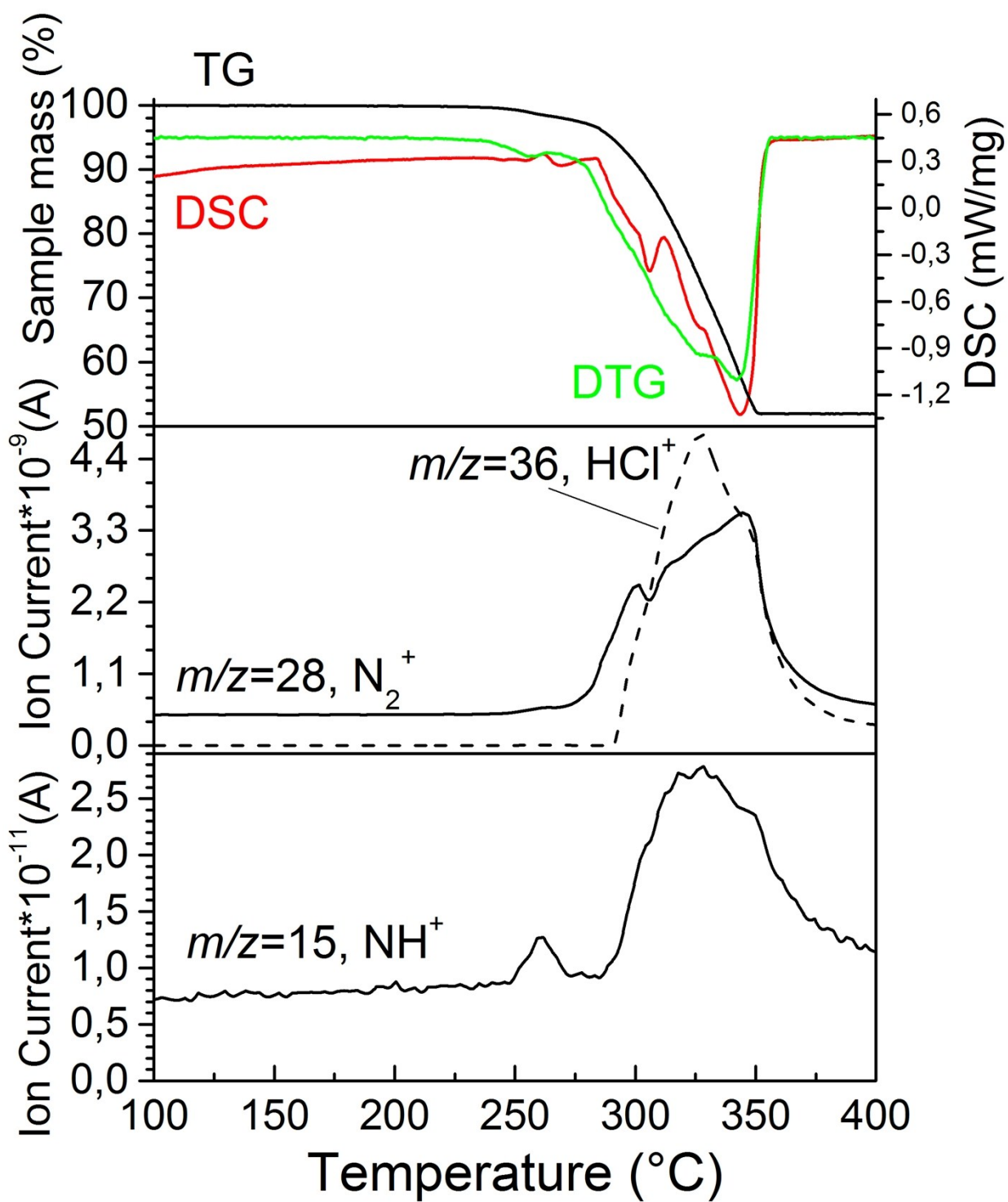
^e Department of Chemistry, University of Oslo, Sem Sælands vei 26, 0371 OSLO, Norway

^f College of Engineering, Swansea University, Bay Campus, Fabian Way, Swansea SA1 8EN, UK

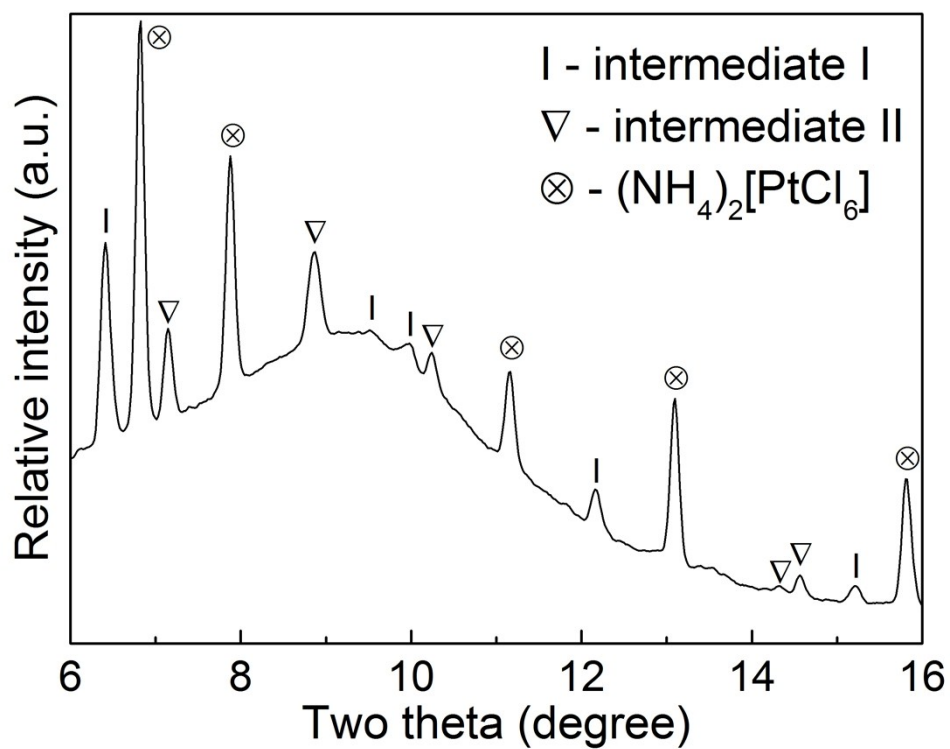




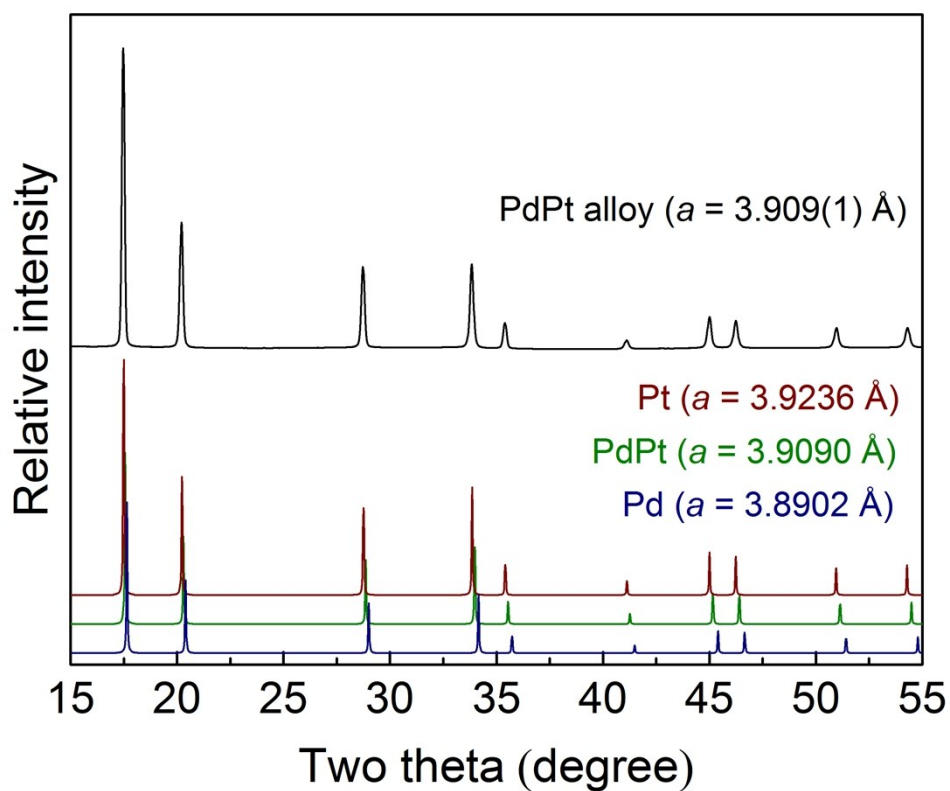
Supplementary Figure S1. k^2 -weighted EXAFS-functions of (a) the Pd K-edges and (b) the Pt L₃-edges during thermal decomposition of $[\text{Pd}(\text{NH}_3)_4][\text{PtCl}_6]$ in He atmosphere.



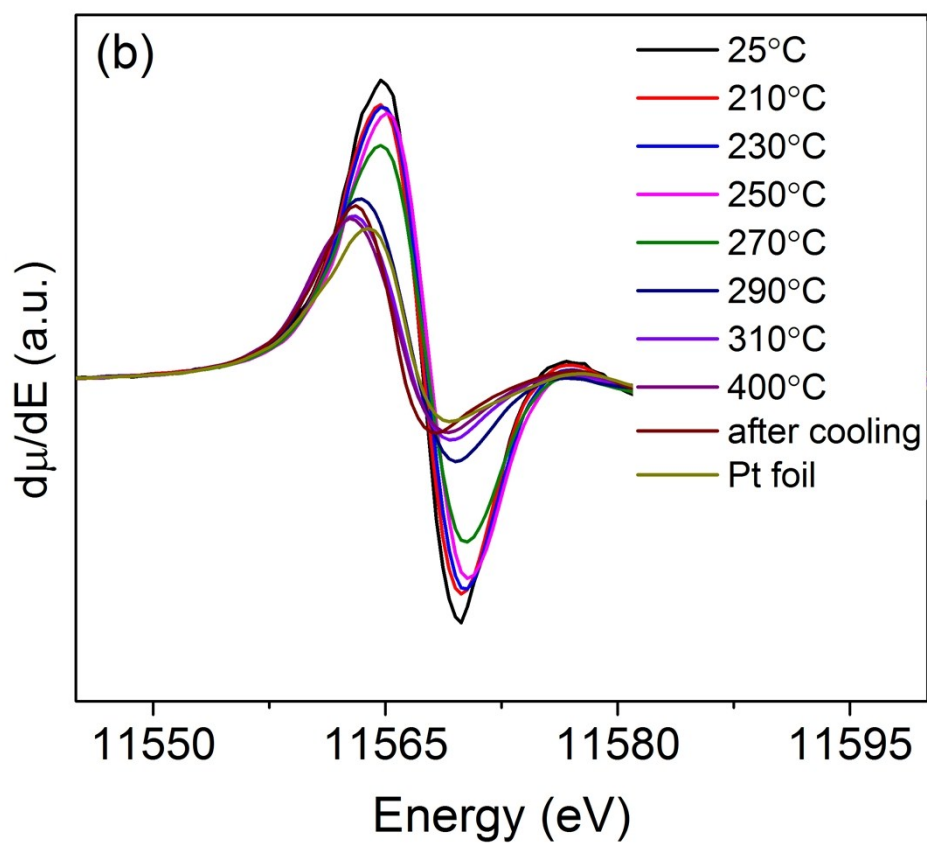
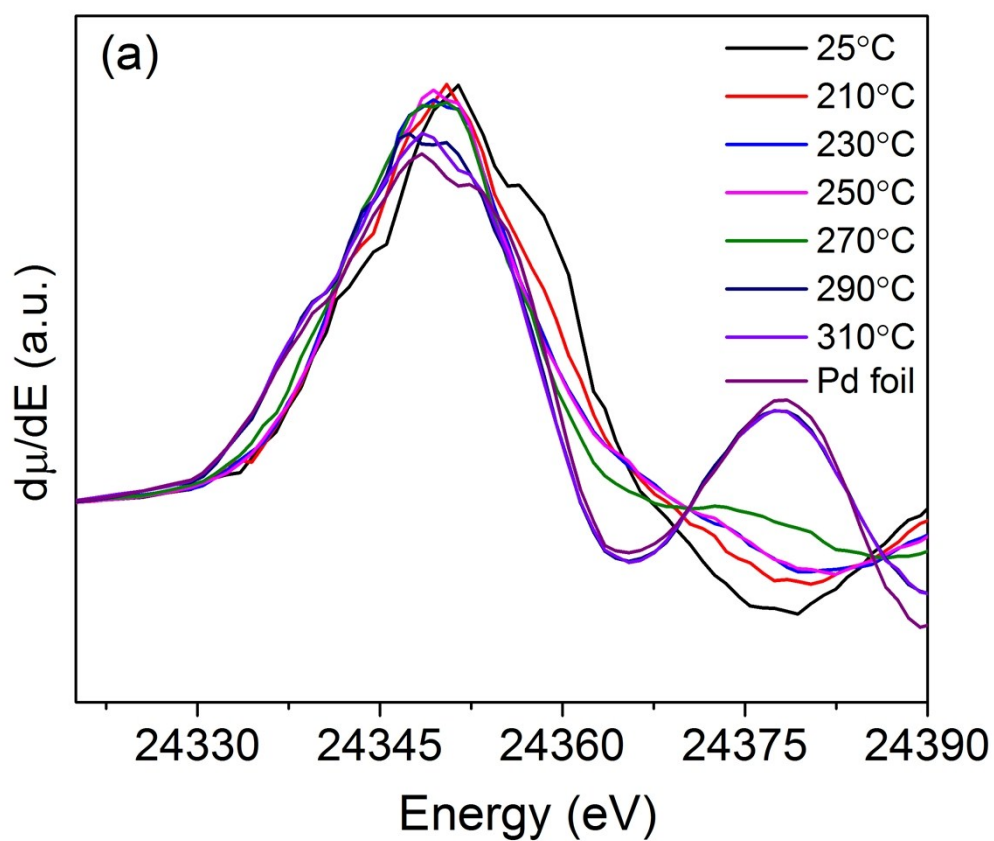
Supplementary Figure S2. TG/DTG/DSC/MS curves for the decomposition of $[\text{Pd}(\text{NH}_3)_4][\text{PtCl}_6]$ in He atmosphere at the heating rate of 10K min^{-1} [J. Therm. Anal. Calorim., 2016, 123, 1183-1195].

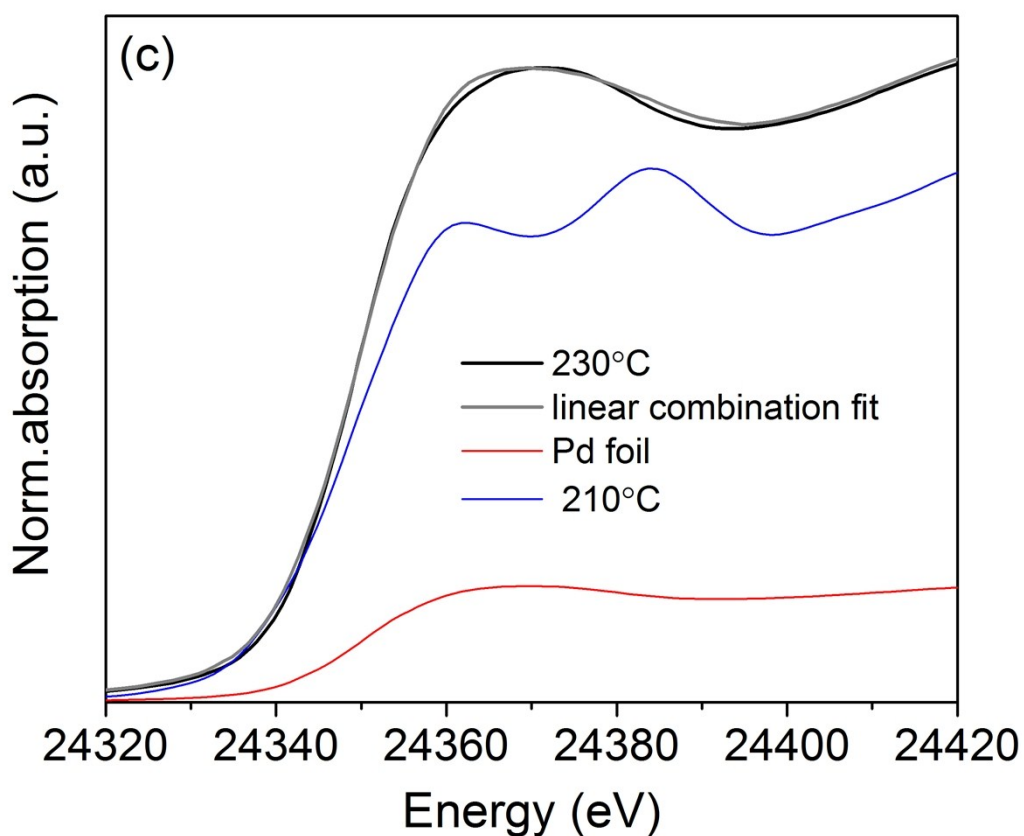


Supplementary Figure S3. PXRD pattern of $[\text{Pd}(\text{NH}_3)_4][\text{PtCl}_6]$ in He flow ($\lambda = 0.68894 \text{ \AA}$) at 260°C .

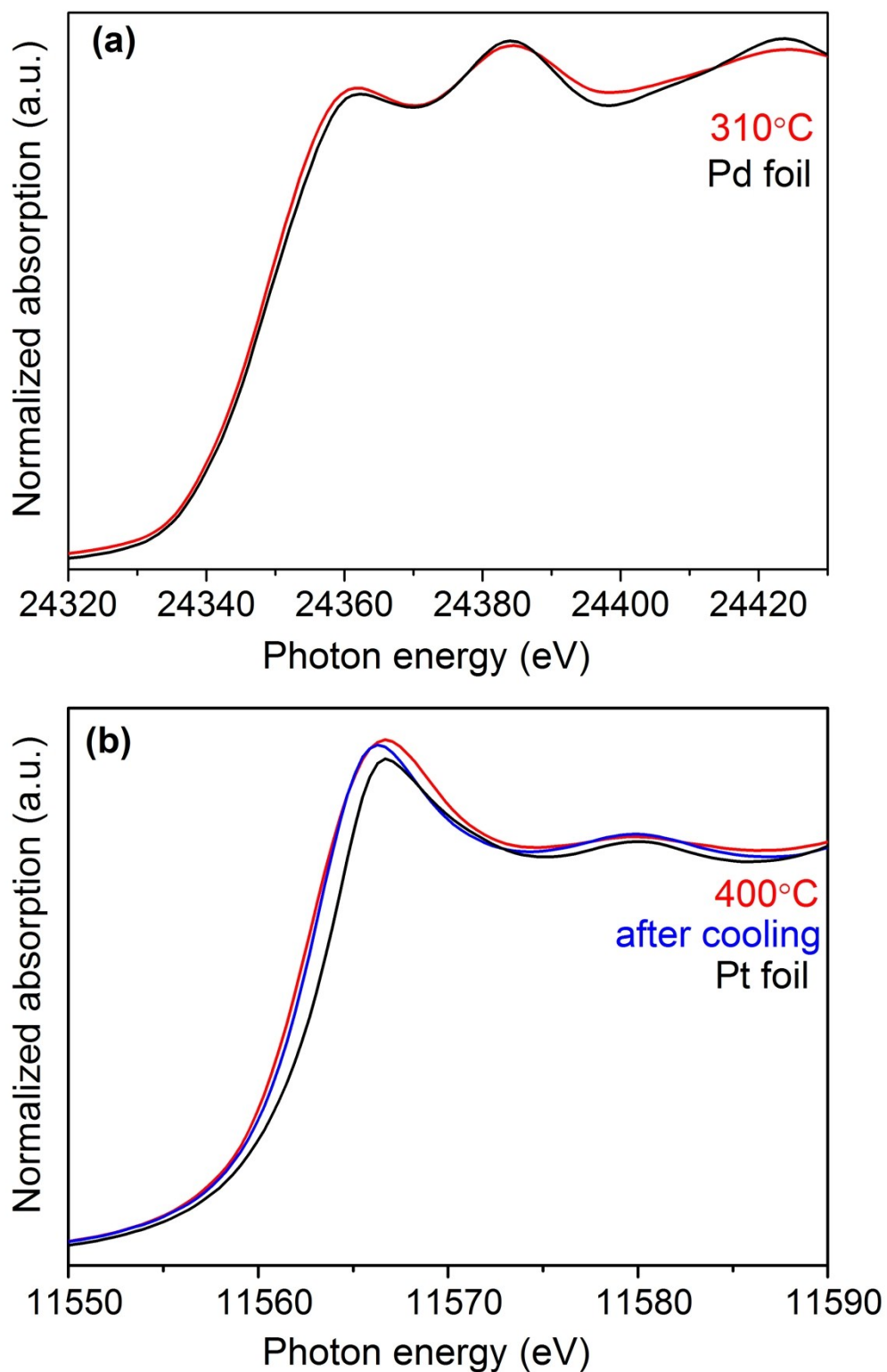


Supplementary Figure S4. Calculated XRD patterns of Pd, Pt, PdPt alloy and experimental PXRD pattern of the PdPt nanoalloy ($\lambda = 0.68894 \text{ \AA}$).





Supplementary Figure S5. The first order derivate of XANES ($d\mu/dE$, where μ is a linear absorption coefficient and E is a photon energy) at (a) the Pd K-edge and (b) the Pt L_3 -edge for $[\text{Pd}(\text{NH}_3)_4][\text{PtCl}_6]$ during thermal decomposition in He atmosphere. (c) Example of linear combination fit for the Pd K-edge XANES spectrum at 230°C by the combination of EXAFS spectra of Pd foil and that measured at 210°C (determined by EXAFS mainly as $\text{Pd}(\text{NH}_3)_2\text{Cl}_2$).



Supplementary Figure S6. Comparison of XANES spectra of the metal foil and the final product of the thermal decomposition of $[\text{Pd}(\text{NH}_3)_4][\text{PtCl}_6]$ at the highest temperature: (a) XANES spectra at the Pd K-edge, (b) XANES spectra at the Pt L_3 -edge.