Supporting Information:

Vapochromic and Vapoluminescent Response of Materials based onPlatinum(II) Complexes Intercalated into Layered Zirconium Phosphate

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Materials and Methods. Volatile organic compounds (VOCs) for the vapochromic experiments and [Pt(tpy)Cl](Cl)·2H_2O were purchased from Aldrich. [Pt(Me_2bzimpy)Cl](Cl)·2.5H_2O was prepared as previously described.[15] The [Pt(Me_2bzimpy)Cl]$^+$- and [Pt(tpy)Cl]$^+$-exchanged ZrP materials were prepared as previously described.[22] ZrP was suspended in aqueous solutions of [Pt(tpy)Cl]$^+$:ZrP at various [Pt(tpy)Cl]$^+$:ZrP molar ratios (1:25, 1:10, 1:5, 1:1, and 5:1) with constant stirring at ambient temperature for five days producing [Pt(tpy)Cl]$^+$-intercalated ZrP materials with different loading levels. The same procedure was used to produce [Pt(Me_2bzimpy)Cl]$^+$-intercalated ZrP materials except that the ZrP was suspended in 1:1 ethanol:water solutions of [Pt(Me_2bzimpy)Cl]$^+$ at 1:30, 1:10, 1:5, and 1:1 [Pt(Me_2bzimpy)Cl]$^+$:ZrP molar ratios. The materials are referenced according to the molar Pt:ZrP concentration ratio of the mixture used in their preparation. For example, the 1:1 [Pt(tpy)Cl]$^+$-exchanged ZrP material was prepared by suspending 0.1 g of 10.3 Å-ZrP in 500 ml of a 5.1×10^{-4} M [Pt(tpy)Cl]$^+$ aqueous solution. The mixture was filtered, and the solid was washed with abundant nanopure water and dried at ambient temperature for three days.

The photographs were obtained using a Kodak EasyShare C-643 digital camera. There was no processing of the images, except that a black circular frame was placed around each for contrast increase (**Image 1**). The vapochromic experiments were performed in a sealed TLC chamber (1.9 L) at room temperature, containing 25 mL of the VOC solvent and a sample holder with the intercalated materials at different loading levels. The platinum(II) complexes ([Pt(Me_2bzimpy)Cl](Cl)·2.5H_2O, [Pt(tpy)Cl](Cl)·2H_2O) and the intercalated materials were dried at 100ºC prior to exposure to each VOC (methylene chloride, tetrahydrofuran, acetonitrile, methanol, n-hexane, and benzene). In each case, solvent uptake was confirmed within seconds by a distinct change in color. Color was checked and recorded at 30 minutes, 1 hour, 2 hours, and 1 day. Total exposure time of the intercalated materials to different solvent vapors was 1 day. The process is fully reversible as indicated by restoration of the original color upon heating the sample for several minutes at 100ºC.

Emission spectra were recorded using a SE-900 spectrofluorometer (Photon Technology International, PTI) with a 150 W xenon lamp as the excitation source and a PTI 710 model photon counting detector with a Hamamatsu R1527P photomultiplier. Intercalated materials were placed at 30° from the excitation source and the detector, using a front-face illumination technique. For thin films, the emission spectra were recorded using a Cary Eclipse Fluorescence Spectrophotometer. In both cases, the excitation wavelength was 355 nm. Films were prepared by suspending ~ 2 mg of intercalated material in 1 mL of diethyl ether, and depositing the suspension on the inside of one face of a quartz cell. Upon evaporation of the ether (~15 min), the intercalated material was found to be adhered to the surface of the cell. The film was heated for 1 hr. at 100ºC to drive off any remaining solvent. The cell was sealed with a septum and injected with 100 μL of the solvent which is immediately evaporated and absorbed into the intercalated material.

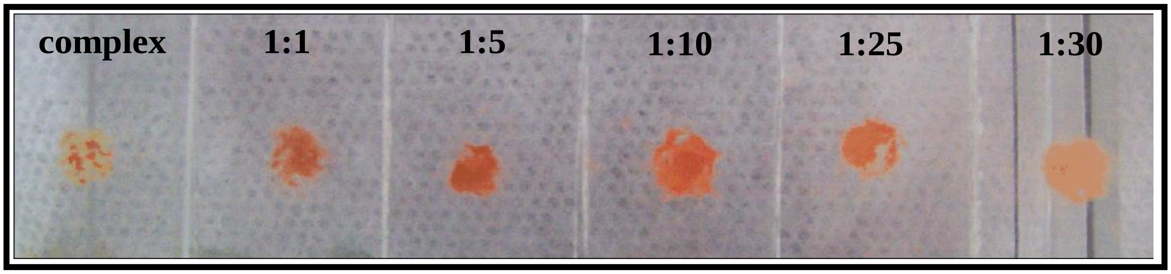

Image 1. Example of the photographs taken from the top view of the TLC chamber under ambient light. The image shows the [Pt(Me$_2$bzimpy)Cl](Cl) complex and [Pt(Me$_2$bzimpy)Cl]$^+$-exchanged ZrP powders materials at different loading levels (Pt:ZrP) supported on glass slides after exposure to hexane vapors at room temperature.

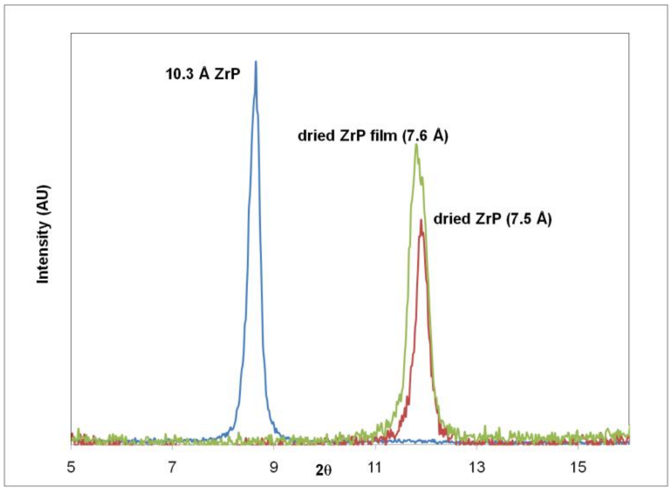

Figure S1. XRPD patterns of 10.3 Å–ZrP, dehydrated phase (α-ZrP), and the dried ZrP film.

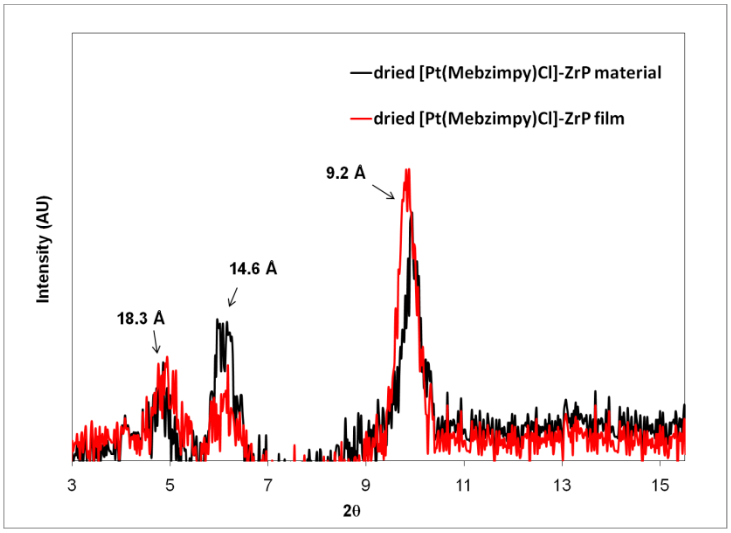

Figure S2. XRPD patterns of dried 1:5 [Pt(Me$_2$bzimpy)Cl]$^+$-exchanged ZrP materials and after the film preparation.

*The relatively high noise level of the XRPD patterns is due to the low availability of sample.

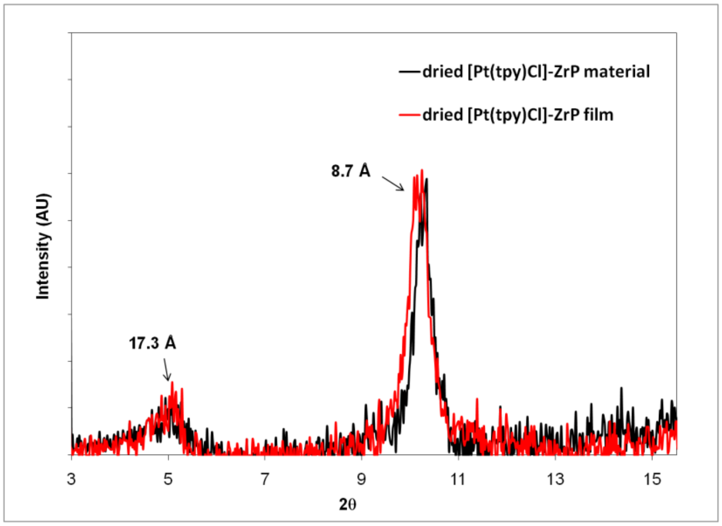

Figure S3. XRPD patterns of dried 1:1 $[Pt(tpy)Cl]^+$-exchanged ZrP materials and after the film preparation. *The relatively high noise level of the XRPD patterns is due to the low availability of sample.

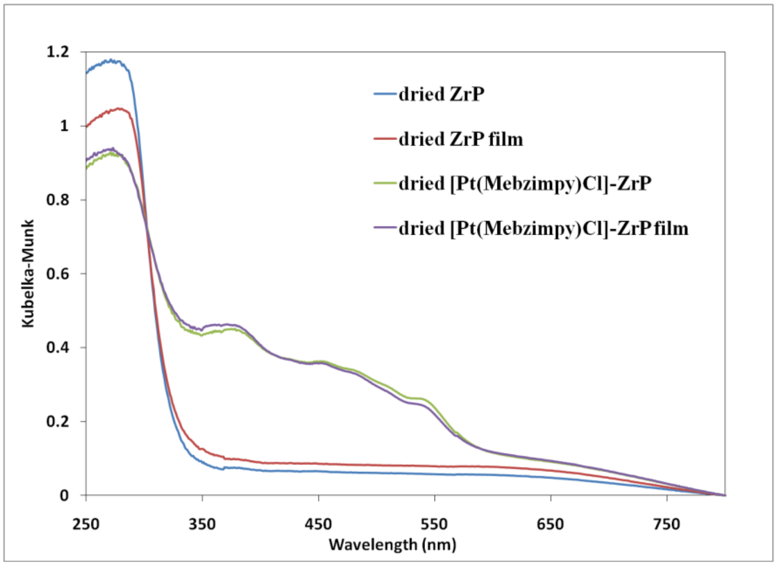

Figure S4. Room-temperature diffuse reflectance spectra of dried ZrP and 1:5 $[Pt(Me_2bzimpy)Cl]^+$-exchanged ZrP dried materials; and after the film preparation.

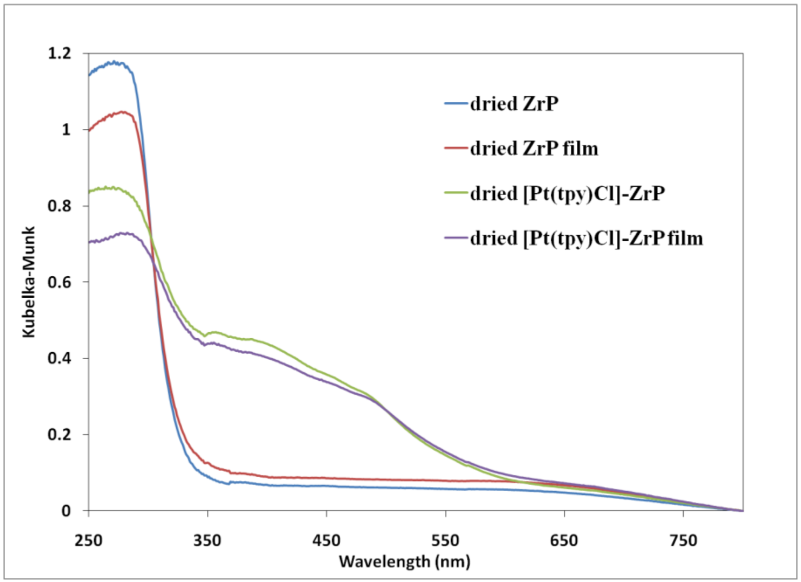

Figure S5. Room-temperature diffuse reflectance spectra of dried ZrP and 1:5 [Pt(tpy)Cl]$^+$-exchanged ZrP dried materials; and after the film preparation.

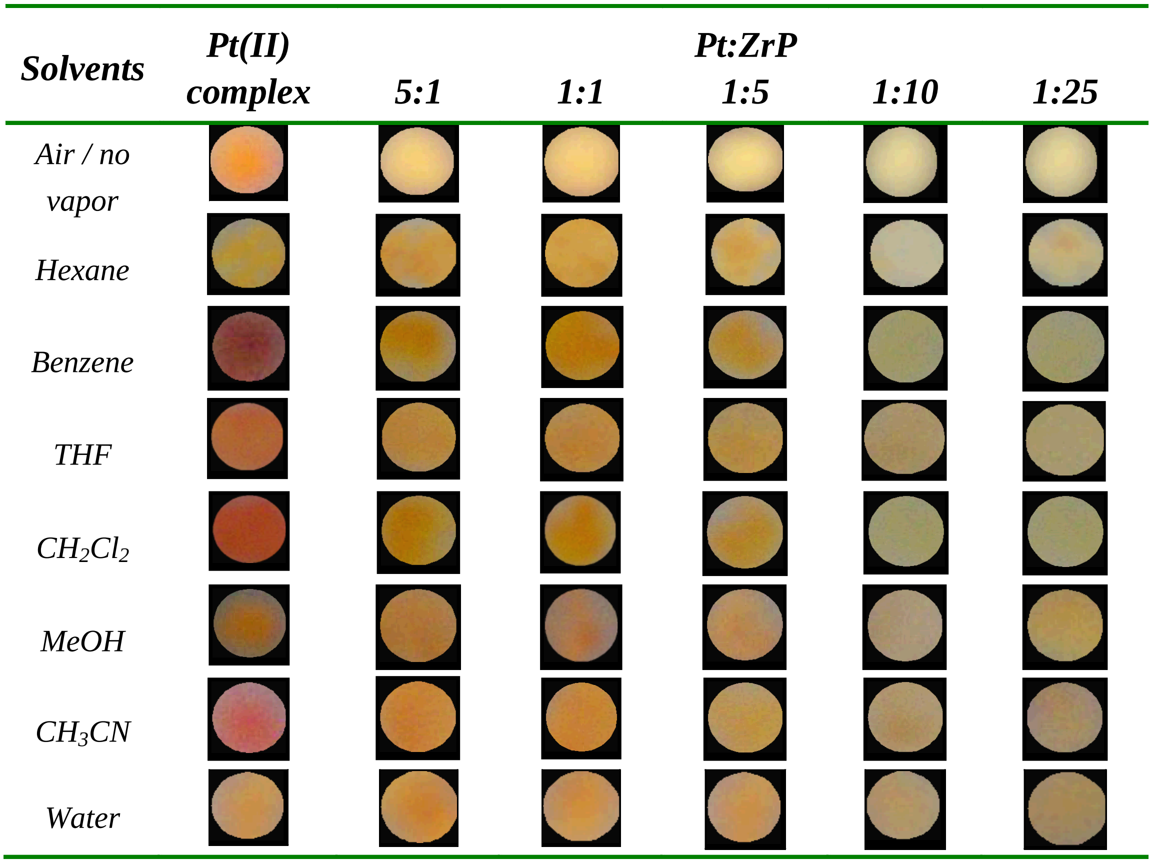

Figure 6S. Photographs of [Pt(tpy)Cl]Cl complex and [Pt(tpy)Cl]$^+$-exchanged ZrP powder materials at different loading levels (Pt:ZrP) supported on glass slides after one day exposure to solvent vapors under ambient light at room temperature.[28]