Electronic Supplementary information

**Geometrically Isomeric Pt(II)/Fe(II)-Based Heterometallo-Supramolecular Polymers with Organometallic Ligands for Electrochromism and Electrochemical Switching of Raman Scattering**

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1. Characterizations of L

Fig. S1 (a) $^1$H NMR spectrum of L using DMSO-d$_6$ as solvent, and (b) MALDI-TOF mass spectrum of L.
2. Characterizations of cis-PtL

Fig. S2 (a) $^1$H NMR spectrum of cis-PtL using CDCl$_3$ as solvent and (b) MALDI-TOF mass spectrum of cis-PtL.
3. Characterizations of trans-PtL

Fig. S3 (a) $^1$H NMR spectrum of trans-PtL using CDCl$_3$ as solvent and (b) MALDI-TOF mass spectrum of trans-PtL.
4. \(^1\)H NMR of cis-polyPtFe

Fig. S4 \(^1\)H NMR spectrum of cis-polyPtFe using DMSO-d\(_6\) as solvent.
5. $^1$H NMR of *trans-polyPtFe*

*Fig. S5* $^1$H NMR spectrum of *trans-polyPtFe* using DMSO-d$_6$ as solvent.
6. Comparison of $^1$H NMR spectra of ligands and polymers

Fig. S6 Comparison of $^1$H NMR spectrum of (a) L, cis-PtL and cis-polyPtFe; and (b) L, trans-PtL and trans-polyPtFe. All the spectra accrued in DMSO-d$_6$ solution at room temperature.
Fig. S7 DOSY NMR spectrum of \textit{cis-polyPtFe} using DMSO-d\textsubscript{6} as solvent.
8. DOSY NMR study of \textit{trans}-polyPtFe

\textbf{Fig. S8} DOSY NMR spectrum of \textit{trans}-polyPtFe using DMSO-d$_6$ as solvent.
9. Schematic representation for polarization in polyPtFe

**Dipole**

**No Dipole**

Fig. S9 Schematic representation of dipole in Pt\(^{2+}\) centers in polyPtFe.
10. Schematic representation of EC device preparation

Fig. S10 Schematic representation of electrochromic device preparation with the polymers.

11. UV-Vis spectrum of L in solid film

Fig. S11 UV-Vis spectra of ligand L in solid thin film.
12. Emission spectra of L

**Fig. S12** Emission spectra of ligand L in solid thin film excited at 323 nm.

**Fig. S13** Emission spectra of ligand L in solid thin film at different excitation wavelengths.
13. Raman spectroscopy of ligand and polymers

Fig. S14 (a) Raman spectra of $L$, cis-polyPtFe and trans-polyPtFe in solid film. $\lambda_{\text{exc}} = 532$ nm, 60 mW, collection time = 3 s.