

## Voltage-induced chromatic phase transition in ferrocene substituted polydiacetylene thin film

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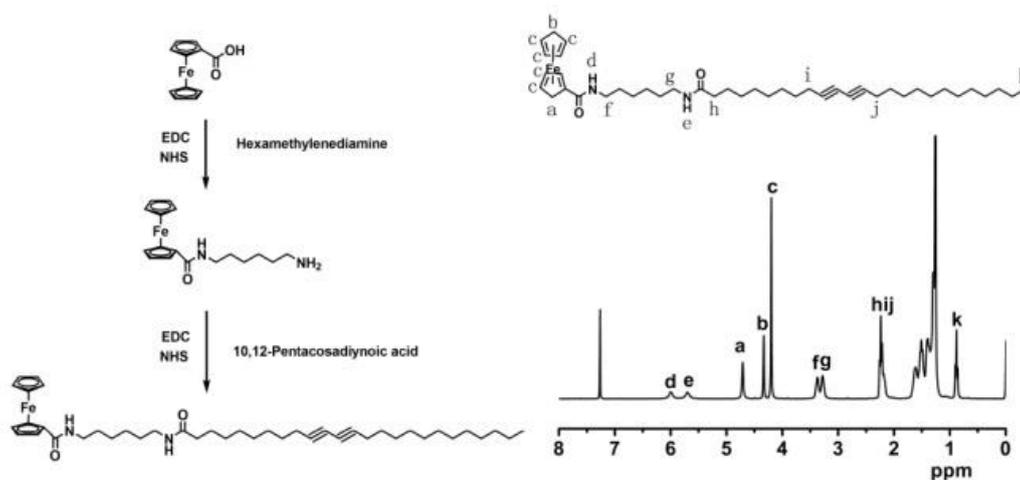


Fig. S1 The molecular structure, synthetic route and 1H NMR characterization of FEDA.

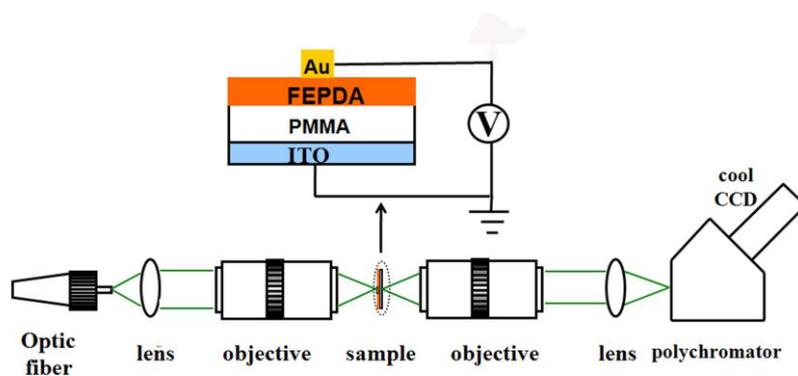


Fig. S2 The optical setup of the CMS experiments for the in situ evaluation of the voltage-induced chromatic phase transition in FEPDA samples. External voltages are applied using a source meter to observe the charge modulation of the optical signal. Detailed sample structure is also described.

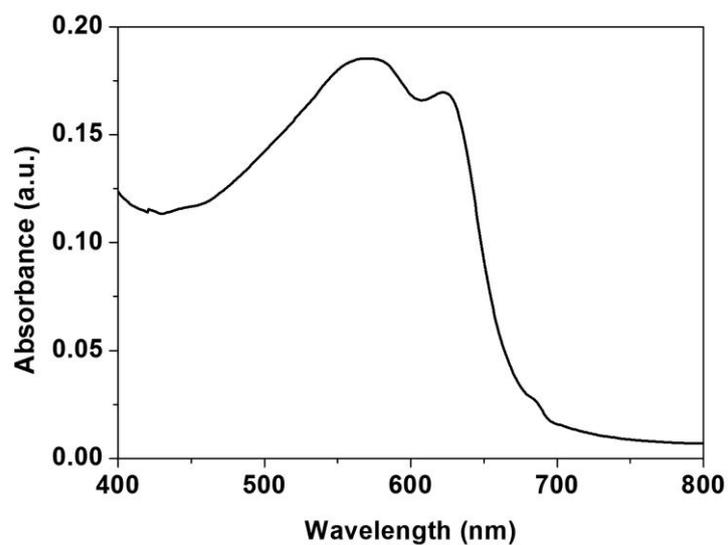


Fig. S3 The typical UV-vis absorption spectra of the FEPDA samples in blue phase.

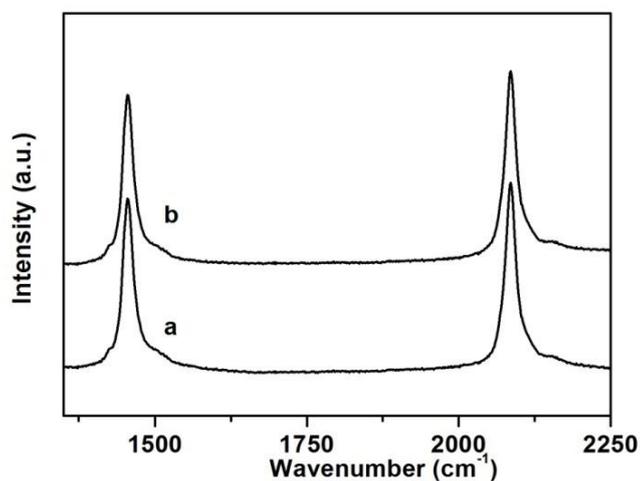


Fig. S4 The typical Raman spectra of the FEPDA samples: (a) before and (b) after the application of the negative bias voltage.

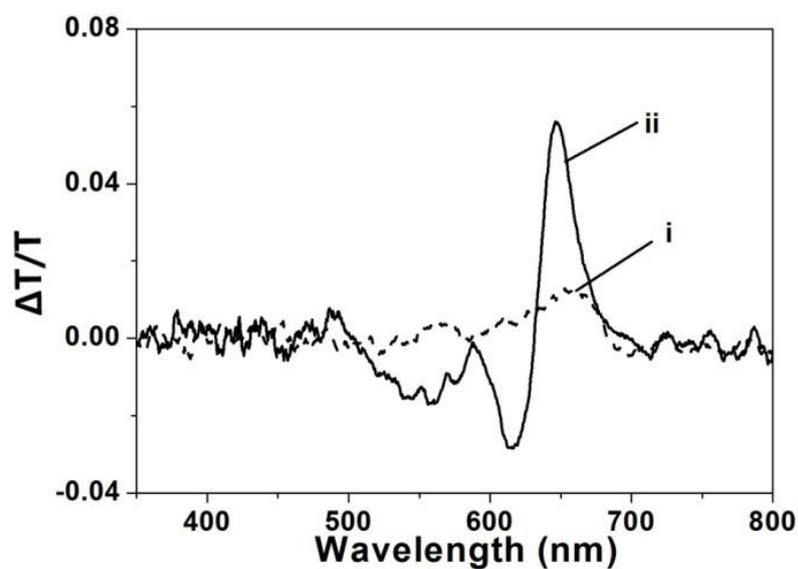
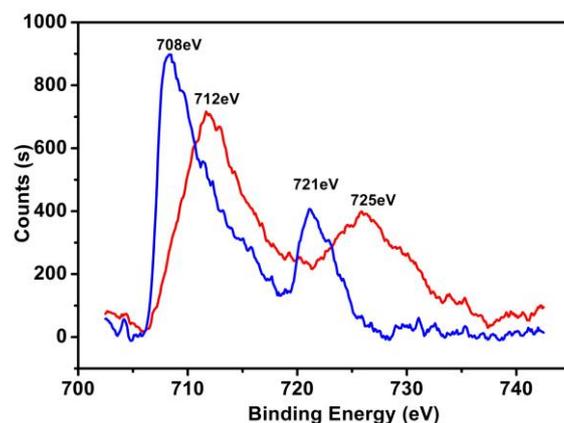
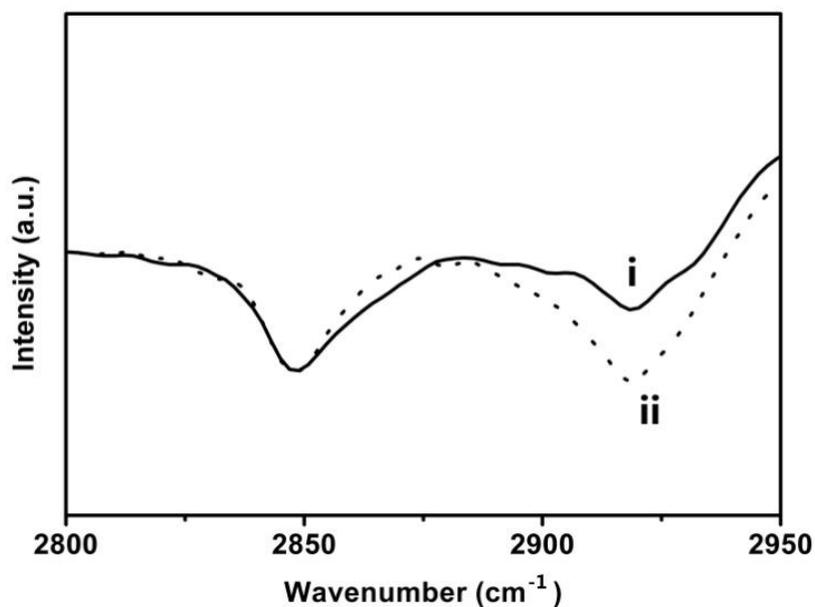


Fig. S5 CMS spectrum for (i) pure PDA sample and (ii) the FEPDA samples obtained the application of -60 V, respectively.



**Fig.S6** XPS of FEPDA sample before (blue) and after (red) the application of a negative voltage.

The xps peak of Fe2P shifted to a higher energy position after the application of a negative voltage. The peak of Fe<sub>2</sub>P<sub>3/2</sub> shifted from 708eV to 712eV. And the peak of Fe<sub>2</sub>P<sub>5/2</sub> shifted from 721eV to 725eV. It indicated that ferrocene was oxidized from Fe(II) to Fe(III)<sup>1,2</sup>.



**Fig. S7** Transmission FTIR spectra of FEPDA samples (i) before and (ii) after the application of the negative bias voltages.

1. A. W. Taylor and P. Licence, *ChemPhysChem*. 2012, **13**, 1917.
2. T. Kitagawa, H. Matsubara, K. Komatsu, K. Hirai, T. Okazaki and T. Hase, *Langmuir* 2013,**29**,4275