Supporting Information for:

Synthesis of New Poly(arylamine)s (Aryl = Oligo-*p*-phenyl or pyridyl) by Organometallic Polycondensation and Chemical Properties of the Polymers

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Table S1.	Solubility of polymers	S2
Table S2.	Measurement parameters of ESR	S3
Figures S1-S3.	NMR spectra of the monomers and polymers	S4-6
Figure S4.	IR spectra of the polymers	S7
Figure S5.	Preparation of the ESR samples	S8
Figure S6.	Changes of UV-vis Spectra of **P(DPyA; *N*-Hex)**	S9
Figure S7.	Plots of absorbance for the **P(DPyA; *N*-Hex)** –metal systems	S10
Figure S8.	CV of the film of **P(DPyA; Hex)**	S11

Table S1. Solubility of polymers

Polymer/Solvent	$CHCl_3$ [a]	THF [a]	DMF [a]	DMSO [a]	NMP [a]
P(DPA; *N*-BOC)	S	S	PS	PS	PS
P(TPA; *N*-BOC)	S	S	PS	PS	PS
P(QPA; *N*-BOC)	S	S	PS	PS	PS
P(DPA)	I	I	PS	PS	PS
P(TPA)	I	I	I	I	I
P(QPA)	I	I	I	I	I
P(DPyA; *N*-MB)	S	S	PS	PS	PS
P(DPyA; *N*-Hex)	S	S	PS	PS	PS

[a] S: soluble, PS: partially soluble, I: insoluble.

ESR measurements of the polymers were carried out under the conditions summarized in Table S2.

Table S2. Measurement parameters of ESR

sample	P(DPA)	P(TPA)	P(QPA)
microwave power/mW	0.100	0.100	0.100
sweep time/s	30	30	30
sweep width/mT	5	5	5
time constant/s	0.1	0.1	0.1
field modulation width/mT			
non-doped	0.125	0.063	0.063
iodine-doped	0.063	0.400	0.063
frequency/GHz			
non-doped	9.1853	9.1932	9.1943
iodine-doped	9.1906	9.1927	9.1939
receiver gain			
non-doped	x 100	x 100	x 100
iodine-doped	x 2	x 1	x10
accumulation count			
non-doped	20	6	10
iodine-doped	1	1	1

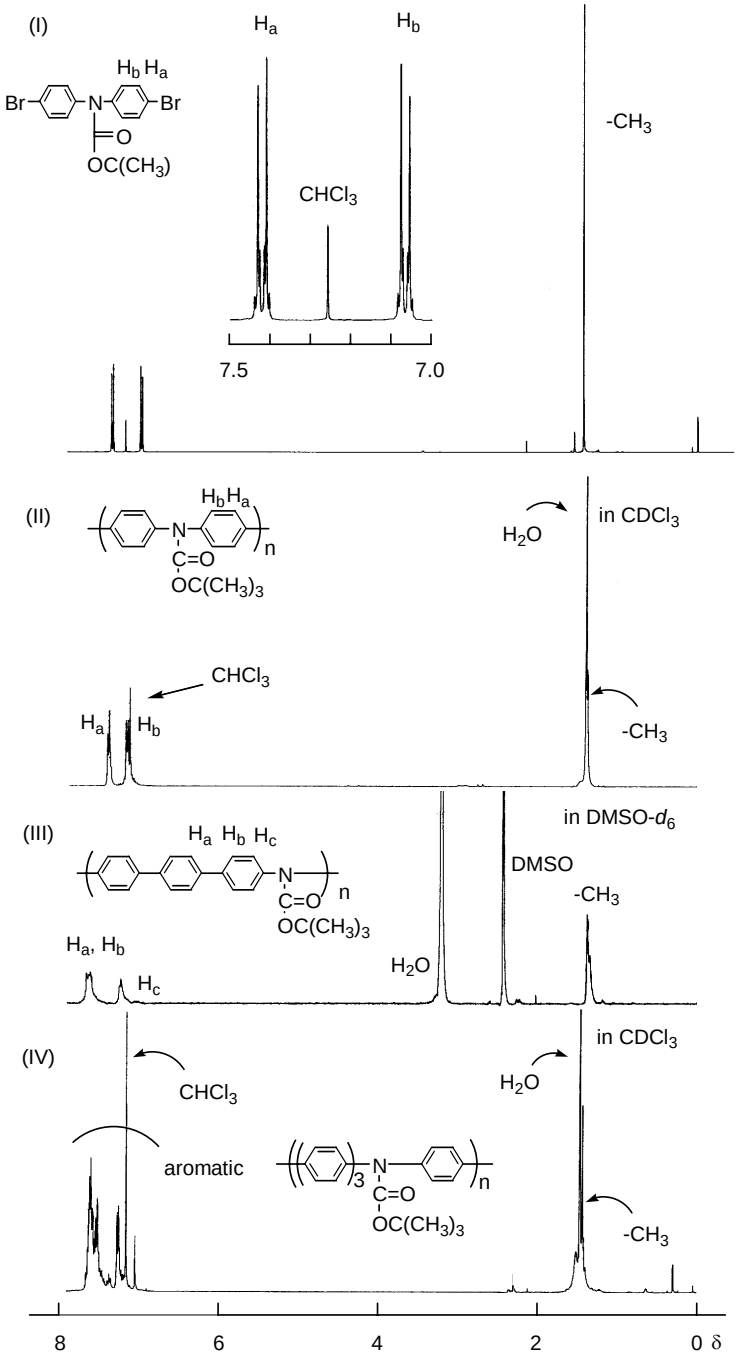

Figure S1. ^{1}H NMR spectra of (I) the BOC monomer, (II) **P(DPA; *N*-BOC)**, (III) **P(TPA; *N*-BOC)**, and (IV) **P(QPA; *N*-BOC)**.

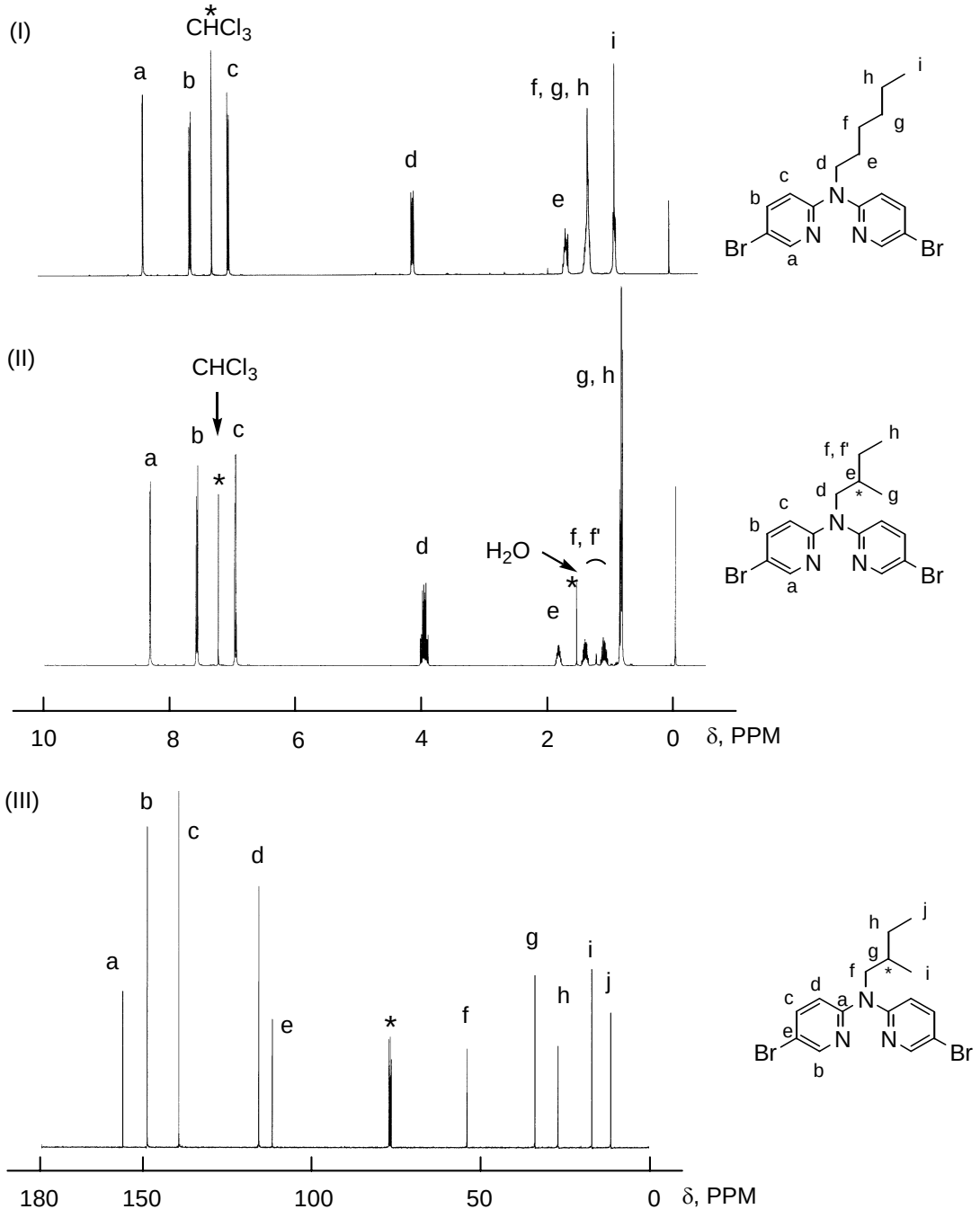

Figure S2. ^{1}H NMR spectra of (I) *N*-Hex monomer and (II) *N*-MB monomer in $CDCl_3$. (III): ^{13}C NMR spectrum of the *N*-MB monomer in $CDCl_3$. The peak with * is due to the solvent.

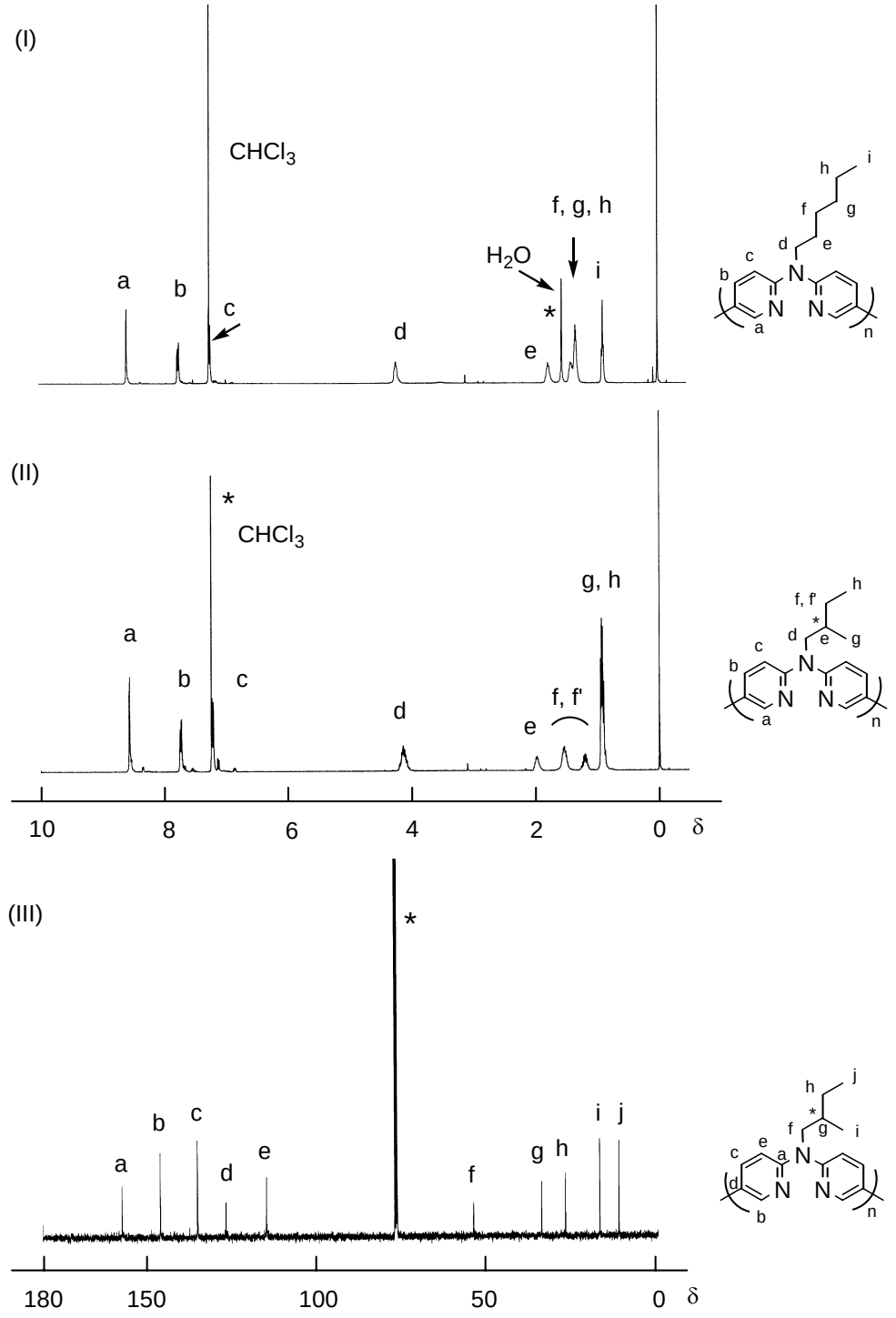

Figure S3. ^{1}H NMR spectra of (I) **P(DPyA; *N*-Nex)** and (II) **P(DPyA; *N*-MB)** in $CDCl_3$. (III): ^{13}C NMR spectrum of **P(DPyA; *N*-MB)** in $CDCl_3$. The peak with * is due to the solvent.

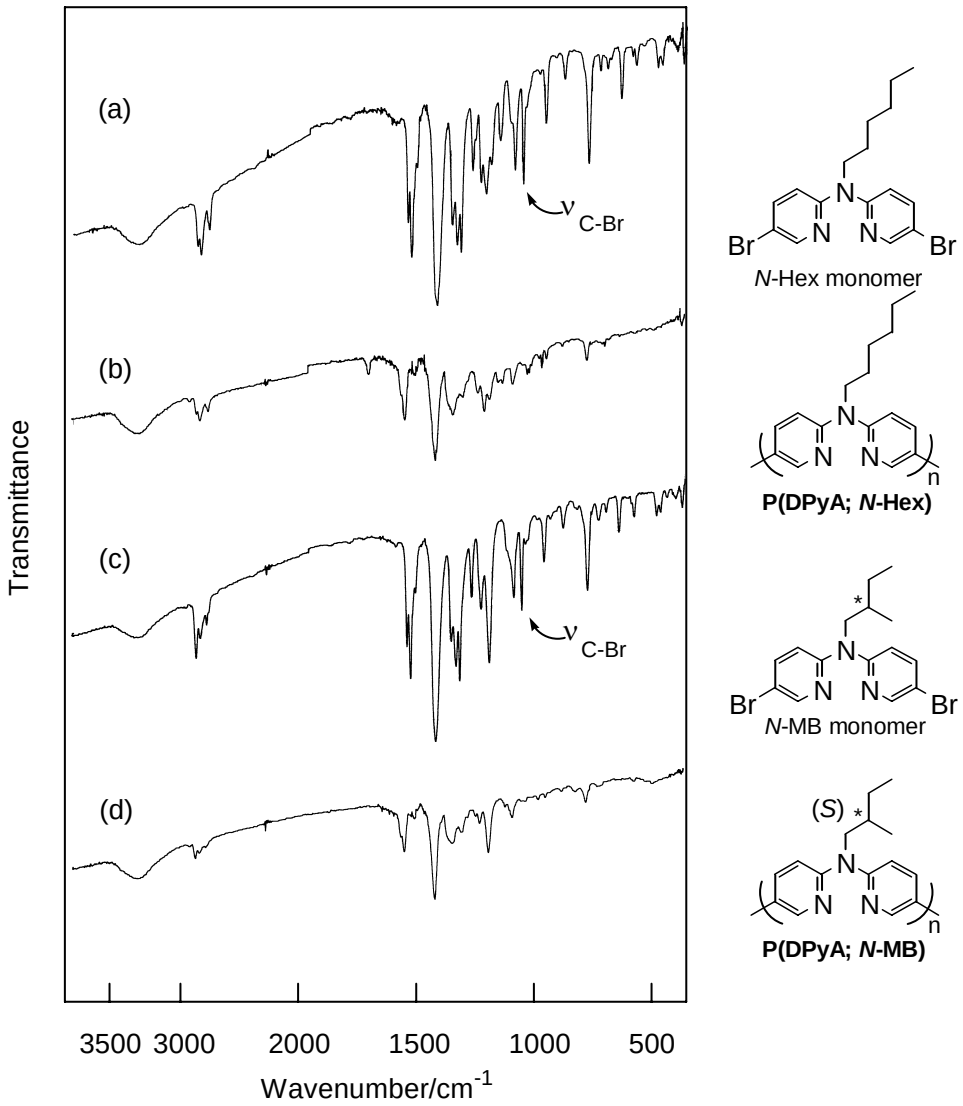

Figure S4. IR spectra of (a) *N*-Hex monomer, (b) **P(DPyA; *N*-Hex)**, (c) *N*-MB monomer, and (d) **P(DPyA; *N*-MB)**.

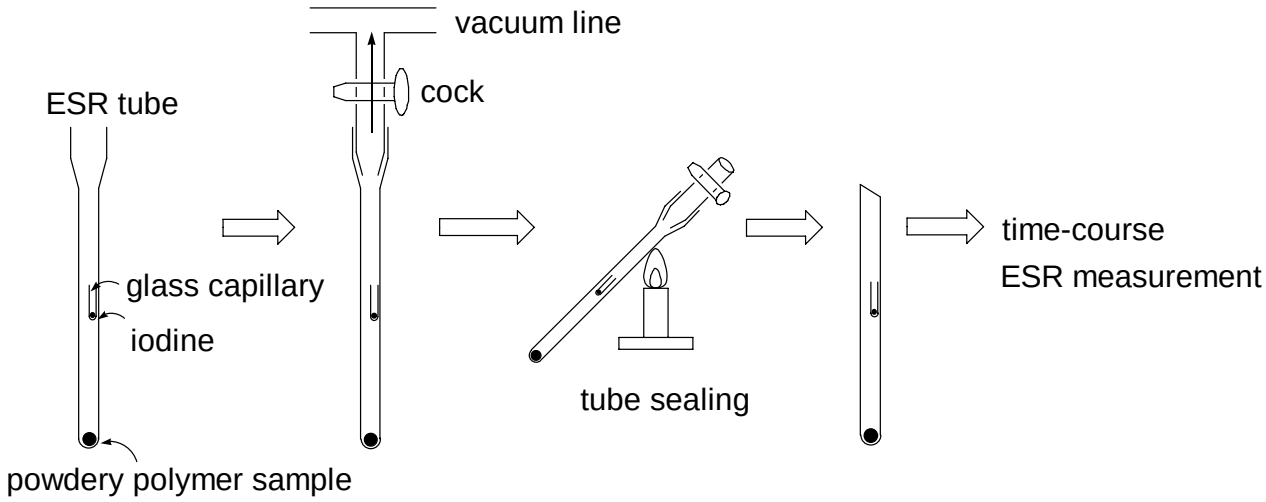

Figure S5. Schematic illustration of the preparation of the ESR sample for in situ measurement of the powdery polymer samples during doping with I_2 vapor. The preparation of the samples are indicated the following procedures; (i) A powdery polymer sample in a glass capillary was placed in an ESR tube. (ii) Iodine vapor was introduced to the polymer sample under vacuum. (iii) The ESR tube was sealed. (iv) Time-course of the ESR spectrum was measured.

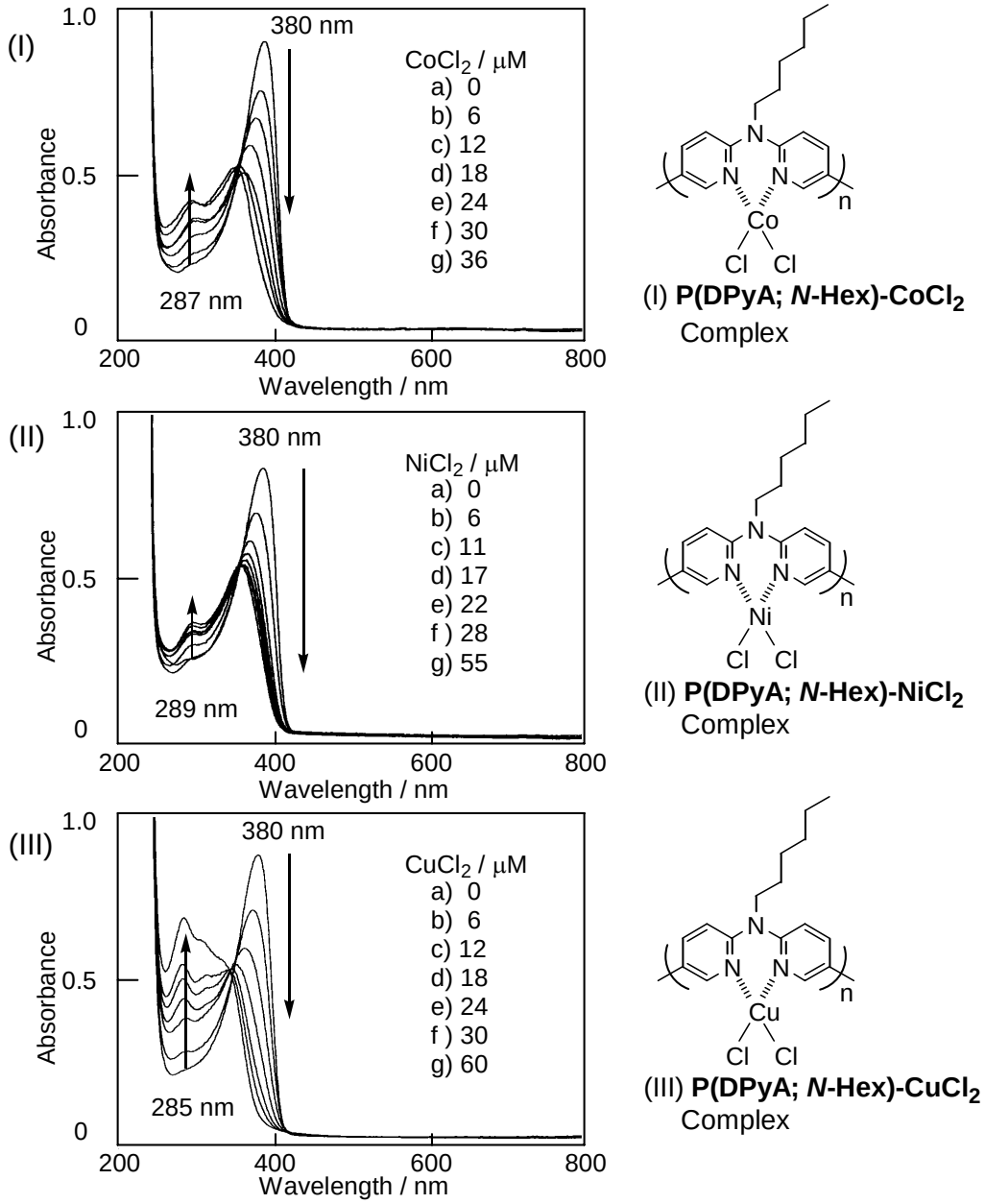

Figure S6. Changes of UV-vis Spectra of **P(DPyA; *N*-Hex)** on addition of a acetonitrile or methanol solution of transition metal salts. Addition of (I) $CoCl_2$, (II) $NiCl_2$, and (III) $CuCl_2$. [Polymer] = 30 μM (based on monomer unit).

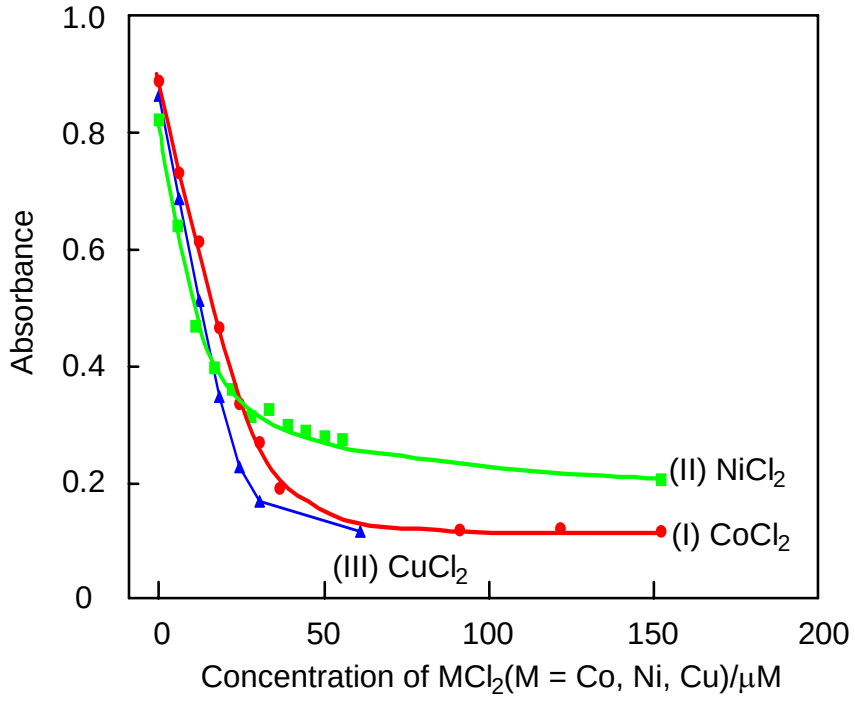

Figure S7. Plots of the absorbance at 380 nm vs. concentration of transition metal salts. Addition of (I) $CoCl_2$, (II) $NiCl_2$, and (III) $CuCl_2$. [Polymer] = 30 μM (based on monomer unit).

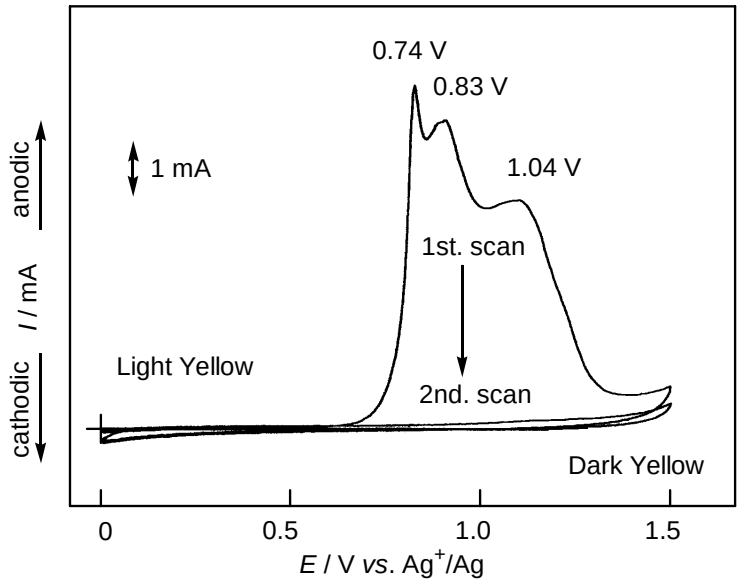

Figure S8. Cyclic voltammogram of the film of **P(DPyA; Hex)** on a Pt plate (1 cm x 1 cm). In an acetonitrile solution of 0.10 M $[NEt_4]BF_4$. Sweep rate = 20 mV s^{-1}.