

Supporting Information

Chemical and physical properties of low-molecular-weight poly(2,6-dimethyl-1,4-phenylene oxide) (LMW-PPO) synthesized by peroxydisulfate and metal/non-metal catalysts

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Table S1. The influence of solvents on the yields of PPO and DPQ.^a

Entry	Solvent	PPO yield/%	DPQ yield/%
1	H ₂ O	42.3	15.2
2	H ₂ O/CH ₃ CN (v/v=1/1)	61.6	5.1

^a Polymerization was carried out by PDS and CuCl₂-MSPDC catalyst in the air.

Table S2. The dielectric properties of PPO.

	Commercial PPO	Cu(I)-O ₂ ^a	Cu(II)-PDS ^b	MSPDC-PDS ^c	MA-PDS ^d
<i>D</i> _κ (at 1 GHz)	2.45	2.74	2.61	2.42	2.32
<i>D</i> _f (at 1 GHz)	0.00174	0.00528	0.00307	0.00171	0.00132

^a PPO was synthesized in the O₂ atmosphere in toluene by CuCl-amine catalyst;

^b PPO was synthesized in the mixture of CH₃CN/H₂O (v/v=9/1) by PDS and CuCl₂-MSPDC catalyst;

^c PPO was synthesized in the mixture of CH₃CN/H₂O (v/v=9/1) by PDS and MSPDC catalyst;

^d PPO was synthesized in the mixture of CH₃CN/H₂O (v/v=9/1) by PDS and MA catalyst.

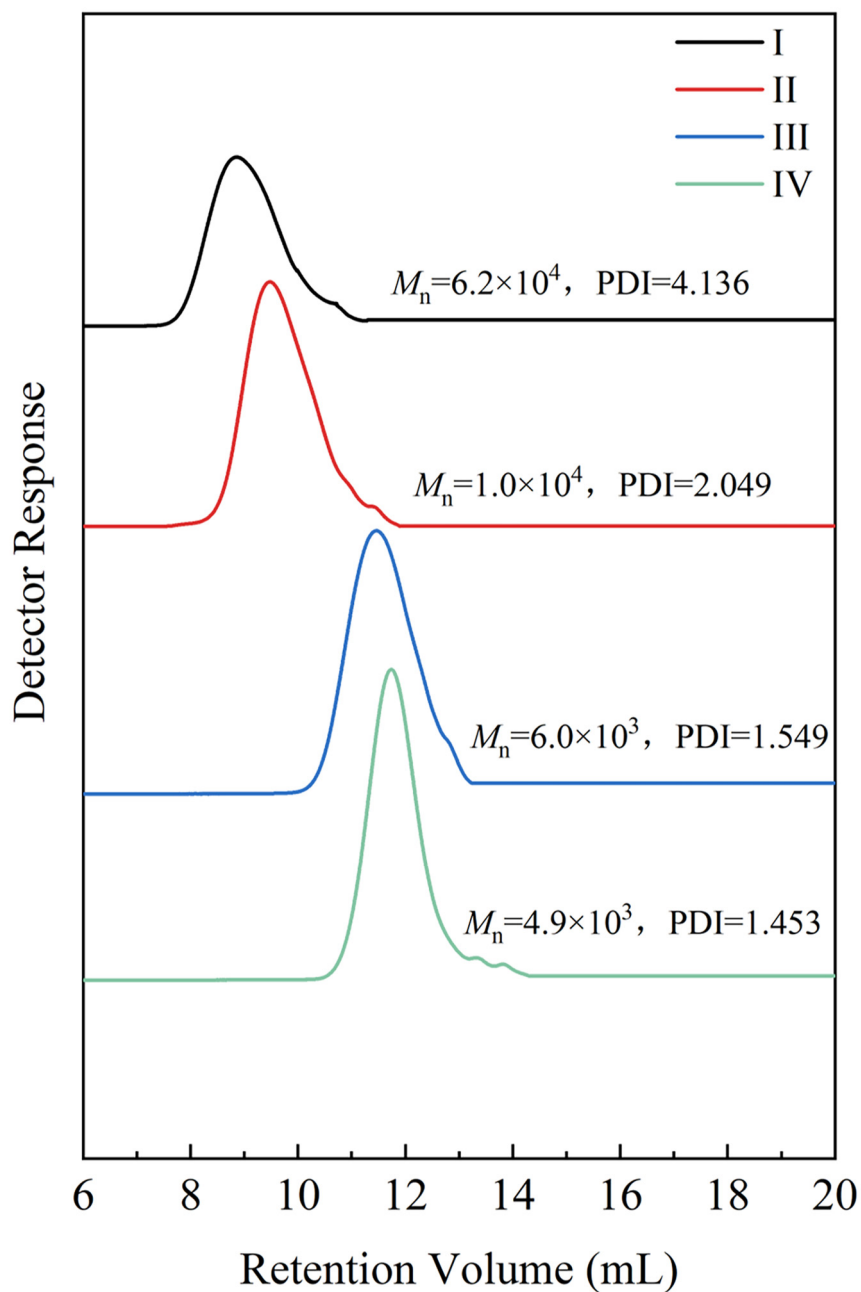


Figure S1. GPC traces of the obtained PPO. I and II were synthesized in the O₂ atmosphere in toluene by CuCl-amine catalyst with the respective molar ratios of PDS:DMP of 0 and 1:1; III was synthesized in the mixture of CH₃CN/H₂O (v/v=9/1) by PDS and CuCl₂-MSPDC; and IV was synthesized in the mixture of CH₃CN/H₂O (v/v=9/1) by PDS and MSPDC catalyst.

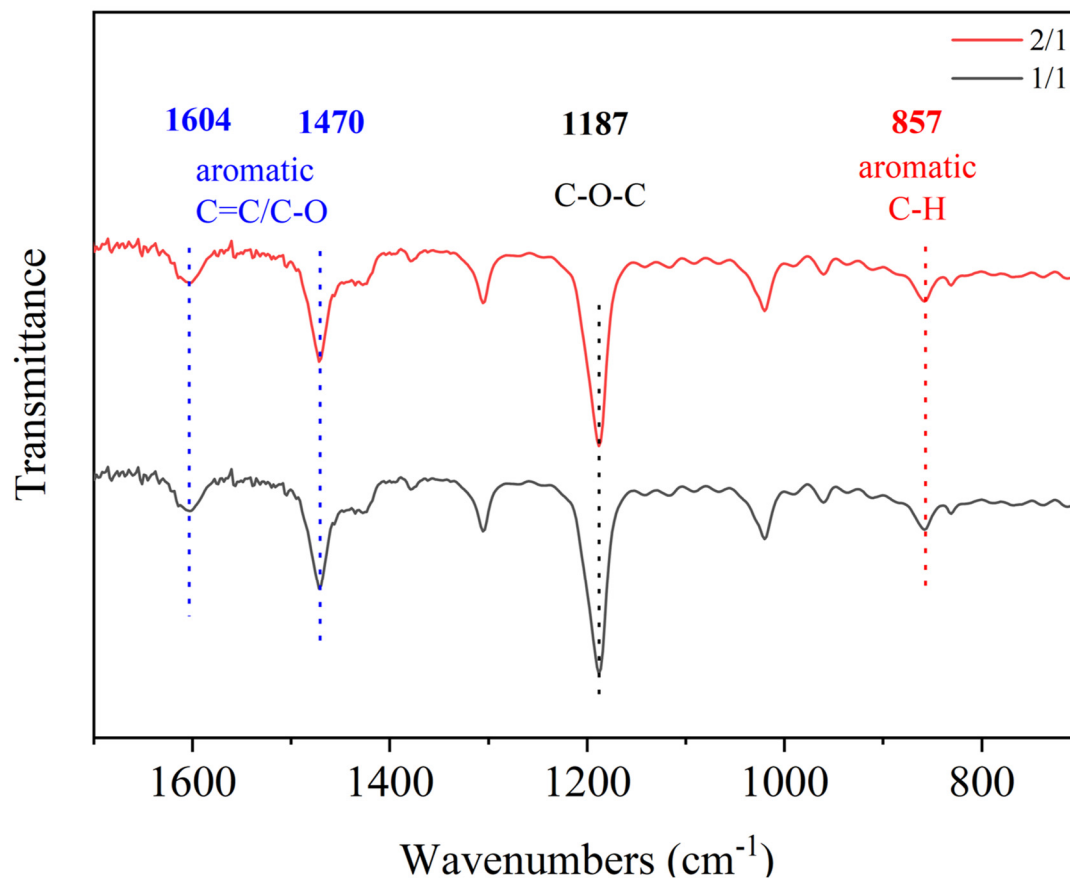


Figure S2. FTIR spectra of the obtained PPO synthesized in the mixture of $\text{CH}_3\text{CN}/\text{H}_2\text{O}$ ($v/v=9/1$) by PDS and CuCl_2 -MSPDC catalyst with different molar ratios of PDS:DMP (2:1 and 1:1).

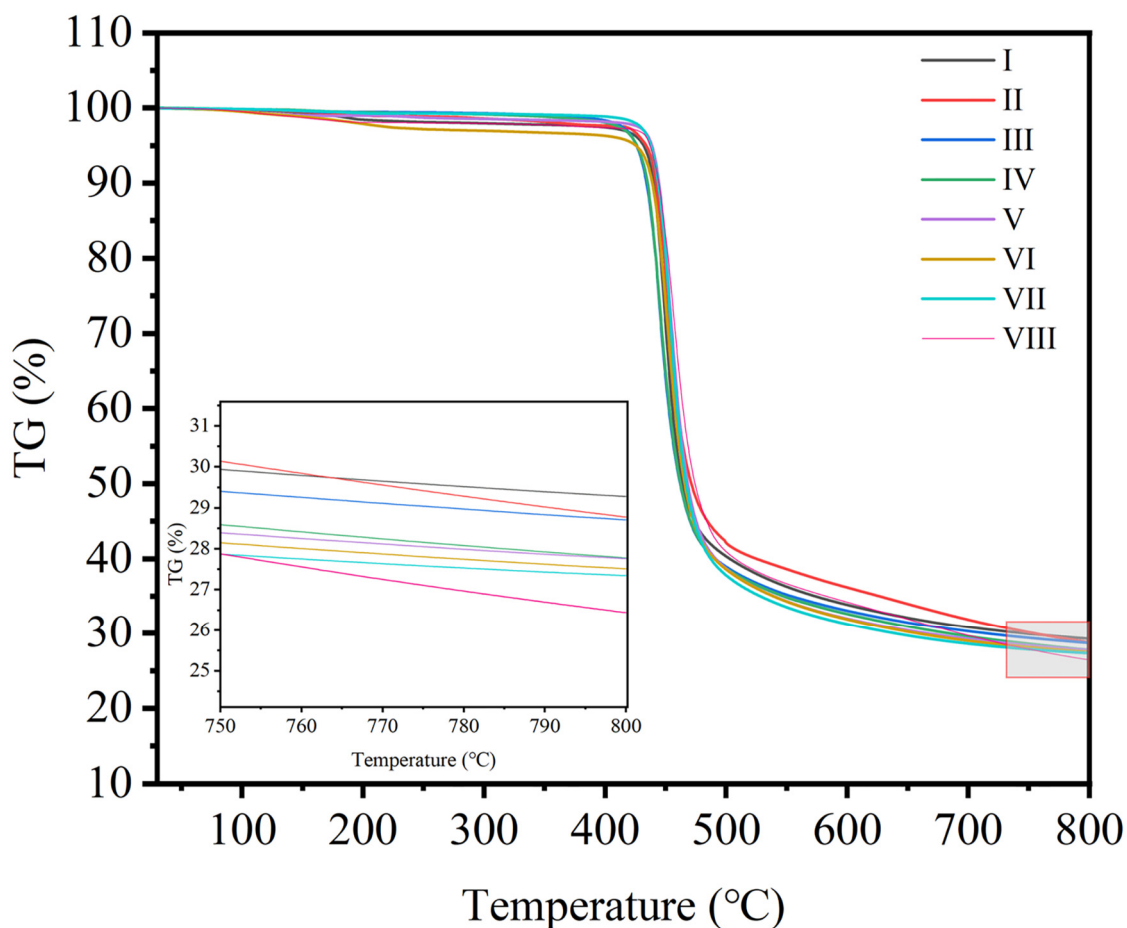


Figure S3. TGA curves of the obtained PPO. I-V: PPO synthesized in the O₂ atmosphere in toluene by CuCl-amine catalyst with the respective molar ratio of PDS:DMP (0, 1:8, 1:4, 1:2 and 1:1), [DMP]=0.2 M, [CuCl]=50 mM, [amine]=0.2 M, temperature: 25°C, time: 2 h; VI: PPO synthesized in the mixture of CH₃CN/H₂O (v/v=9/1) with PDS and CuCl₂-MSPDC catalyst, [DMP]=50 mM, [PDS]=50 mM, [CuCl₂]=5 mM, [MSPDC]=0.05 M, temperature: 50°C, time: 2 h; VII and VIII: PPO synthesized in the mixture of CH₃CN/H₂O (v/v=9/1) by PDS and metal-free catalyst, [DMP]=50 mM, [PDS]=50 mM, temperature: 25°C, time: 2 h, VII: [MSPDC]=5 mM, VIII: MA/CH₃CN/H₂O (v/v/v=2/7/1).