# Supplementary Material

## Highly efficient, reversible iodine capture and exceptional uptake of amines in one viologen-based porous organic polymers

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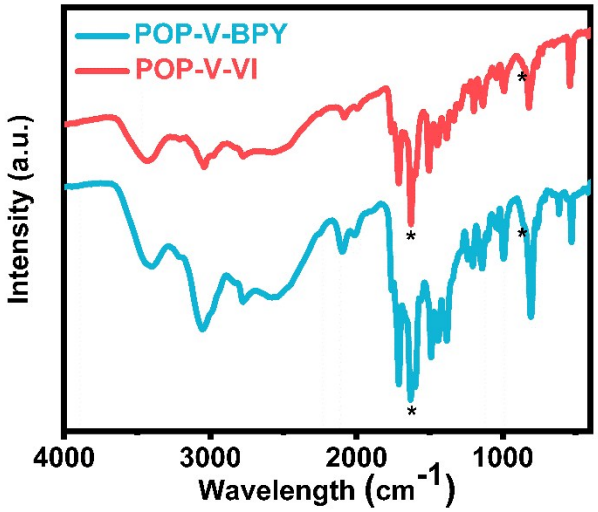


Figure S1. FTIR spectrum of POP-V-VI and POP-V-BPY.

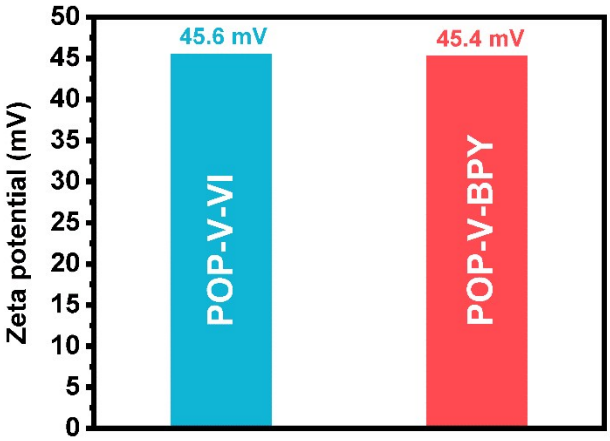


Figure S2. Zeta potential of POP-V-VI and POP-V-BPY.

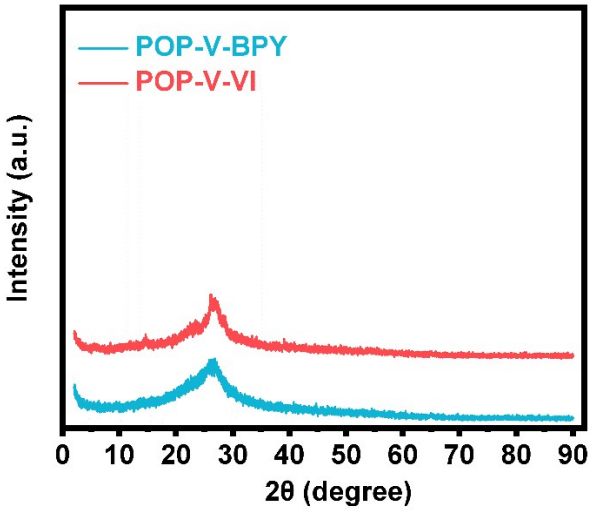

Figure S3. XRD patterns of POP-V-VI and POP-V-BPY.

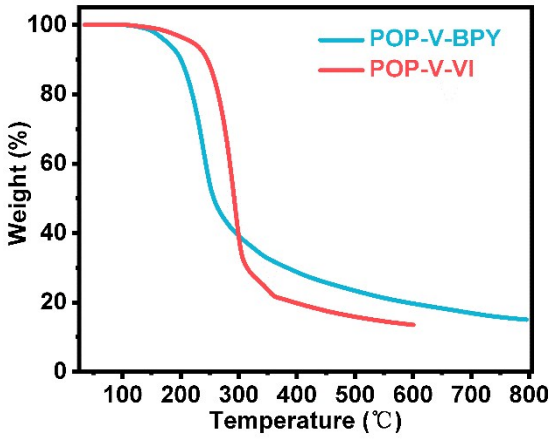


Figure S4. TGA patterns of POP-V-BPY and POP-V-VI under $N_2$.

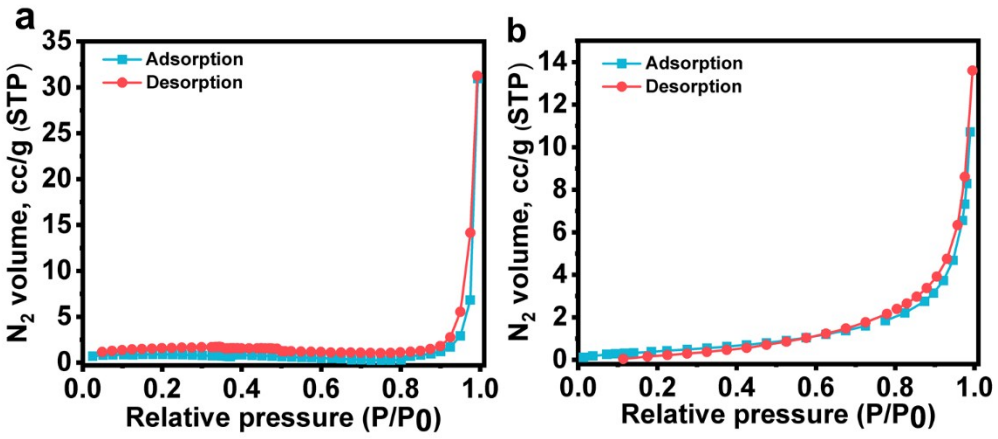


Figure S5. $N_2$ adsorption-desorption isotherms of (a) POP-V-VI and (b) POP-V-BPY.

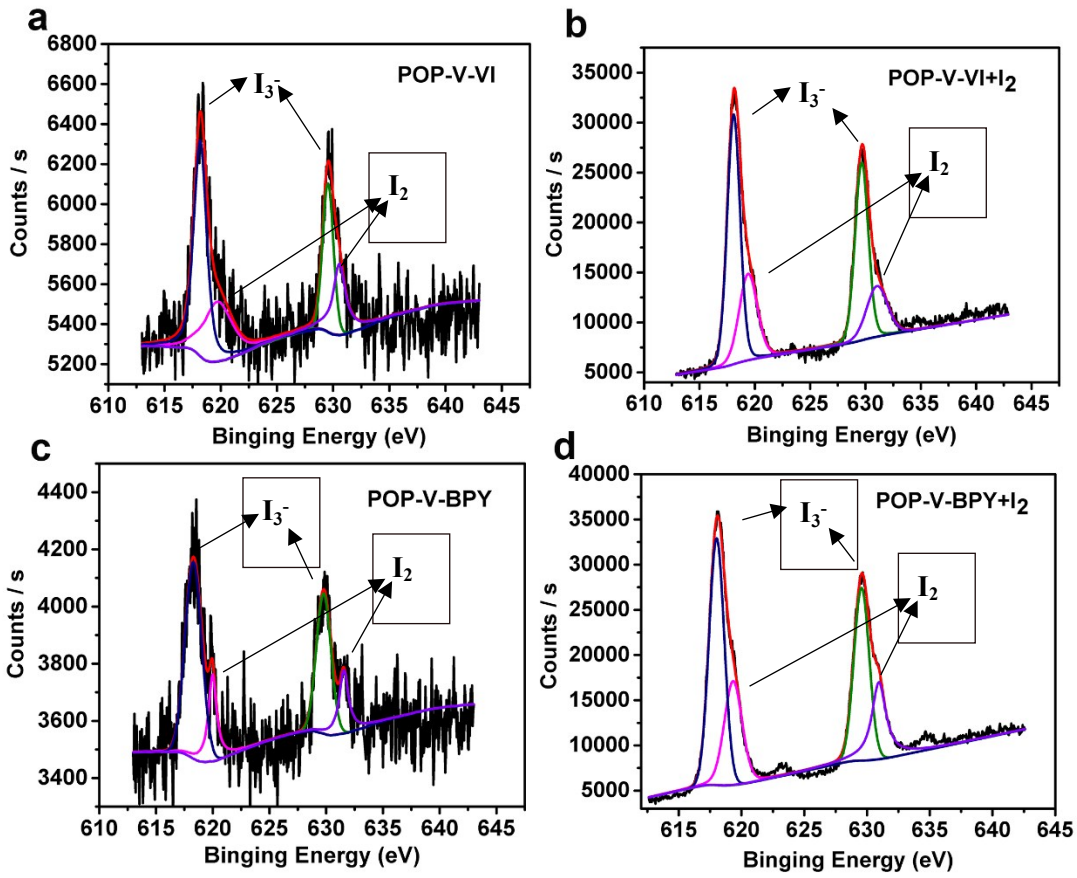


Figure S6. XPS spectrum of (a) POP-V-VI (b) POP-V-VI + $I_2$ (b) POP-V-BPY and (d) POP-V-BPY +$I_2$.

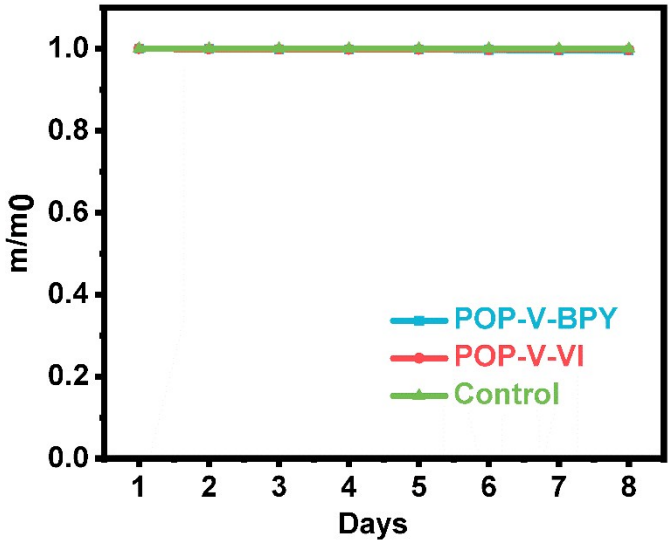

Figure S7. Stability of iodine-loaded POP-V-VI and POP-V-BPY as a function of time at room temperature.

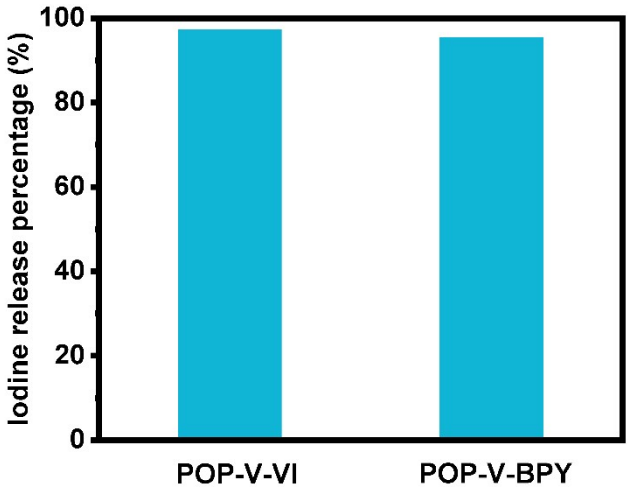


Figure S8. Iodine release from POP-V-VI and POP-V-BPY into ethanol.

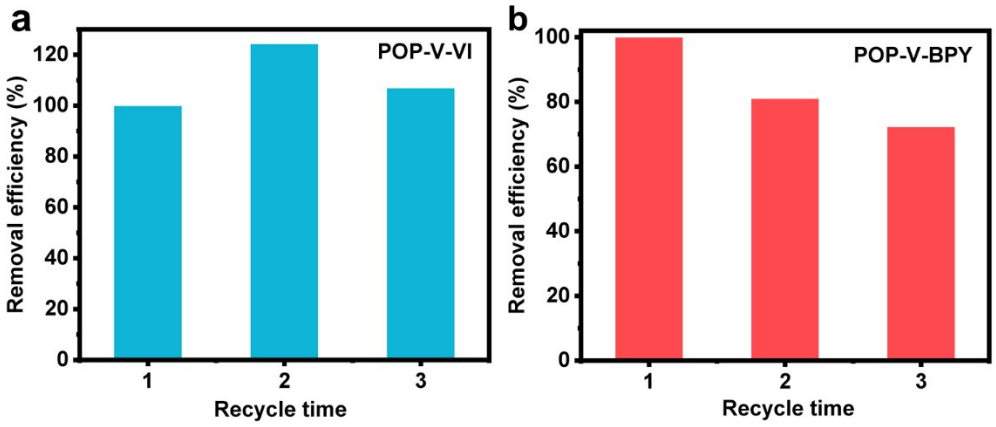


Figure S9. Recyclability of POP-V-VI and POP-V-BPY for the removal of iodine.

Table S1 Parameter comparison between two different adsorption kinetic models for the adsorption of iodine in POP-V-VI and POP-V-BPY.

| Kinetic model | | Model parameter | | | |
|---|---|---|---|---|---|
| Pseudo-first-order model | Sample name | $K_1$ ($min^{-1}$) | $Q_e$ (cal) (mg $g^{-1}$) | $Q_e$ (exp) (mg $g^{-1}$) | $R^2$ |
| | POP-V-VI | 0.1067 | 25.82 | 40.41 | 0.97249 |
| | POP-V-BPY | 0.2187 | 62.63 | 79.37 | 0.60953 |
| Pseudo-second-order model | Sample name | $K_2$ ($g \cdot mg^{-1} \cdot min^{-1}$) | $Q_e$ (cal) (mg $g^{-1}$) | $Q_e$(exp) (mg $g^{-1}$) | $R^2$ |
| | POP-V-VI | 0.0108 | 42.37 | 40.41 | 0.99458 |
| | POP-V-BPY | 0.0066 | 84.39 | 79.37 | 0.99448 |

## Table S2 Summary of iodine uptake abilities by porous materials.

| Number | Adsorbents | Temperature (K) | Pressure (bar) | $S_{BET}$ ($m^2$/g) | Iodine uptake (g/g) | Materials type | ref |
|---|---|---|---|---|---|---|---|
| **1** | **CX4-NS** | **350** | **1** | **468** | **1.14** | **Calix[4]arene based 2D polymer** | **ACS.Appl.Mater.Interfaces.2018.10.17359** |
| **2** | **Por-Py-CMP** | **350** | **1** | **1014** | **1.3** | **CMP** | **RSC.Adv.2016.6.75478** |
| **3** | **Pha-HCOP-1** | **353** | **1** | **217.31** | **1.31** | **COP** | **RSC.Adv.2017.7.54407** |
| **4** | **$COP_1$++** | **345** | **1** | **17.9** | **1.6** | **Covalent Organic nanosheets** | **Chem.Eur.J.2018.24.8648** |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 5 | TPTT | 350 | 1 | 315.5 | 1.77 | POP | Polym.chem.2018.9.777 |
| 6 | NTP | 350 | 1 | 1067 | 1.8 | POP | ACS.Macro.Lett, 2016, 5, 1039 |
| 7 | NOP-54 | 348 | 1 | 1178 | 2.02 | POP | Chemical.Engineering.Journal.334.2018.900 |
| 8 | NiP-CMP | 350 | 1 | 2600 | 2.02 | CMP | Chem.Commun.2014.50.8495 |
| 9 | CMPN-3 | 343.3 | 1 | 1386 | 2.08 | CMP | J.Mater.Chem.A.2015.3.87 |
| 10 | NCMP-1 | 358 | 1 | 58 | 2.15 | CMP | ACS.Appl.Mater.Interfaces.2017.9.38390-38400 |
| 11 | APOP | 350 | 1 | 490 | 2.2 | POP | Materials.Letters.229.2018.240-243 |
| 12 | SCMP-2 | 350 | 1 | 855 | 2.22 | CMP | ACS.Appl.Mater.Interfaces.2016.8.21063 |
| 13 | NRPP-2 | 360 | 1 | 1028 | 2.22 | POP | Acs.Appl.Mater.Interfaces.2018.10.16049-16058 |
| 14 | Azo-Trip | 350 | 1 | 510.4 | 2.38 | POP | Polym.chem.2016.7.643 |
| 15 | PAF-24 | 350 | 1 | 136 | 2.76 | PAF | Angew.Chem.Int.Ed.2015.54.12733 |
| 16 | AzoPPN | 350 | 1 | 400 | 2.9 | POP | Chem.Eur.J.2016.22.11863 |
| 17 | HCMP-3 | 358.15 | 1 | 50 | 3.36 | CMP | Macromolecules.2016.49.6322-6333 |
| 18 | CTF-CTTD | 348 | 1 | 1684 | 3.87 | POF | Ind.Eng.Chem.Res.2018.57.15114 |
| 19 | POP-V-BPY | 350 | 1 | 10 | 4.2 | POP | In this work |
| 20 | ADB-S | 350 | 1 | 41.53 | 4.43 | POP | Chem.Asian.J.2018.13.2046 |
| 21 | TTPB | 350 | 1 | 222 | 4.43 | CMP | J.mater.chem. A. 2017, 5.7612 |
| 22 | TatPOP-2 | 350 | 1 | 36.5 | 4.5 | CMP | Chem.commun.2018.54.8450 |
| 23 | COF-DL229 | 350 | 1 | 1762 | 4.7 | 3D-COF | Chem.Eur.J, 2018,24,585 |
| 24 | CalPOF-1 | 350 | 1 | 303 | 4.77 | POF | ACS.Sustainable.Chem.Eng.2018.6.17402 |
| 25 | SIOC-COF-7 | 350 | 1 | 618 | 4.81 | COF | Chem.Commun.2017.53.7266 |
| 26 | PSIF-1a | 350 | 1 | 320 | 4.85 | Porous silsesquiox | Acs.Appl.Mater.Interface.2018.10.19964 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | | ane-imine Frameworks | |
| 27 | POP-V-VI | 350 | 1 | 10 | 4.86 | POP | In this work |
| 28 | TPT-BD COF | 350 | 1 | | 5.43 | COF | Chem.Mater.2018.30.2299-2308 |
| 29 | TPB-DMTP COF | 350 | 1 | 1927 | 6.26 | COF | Adv.Mater.2018.30.1801991 |