Supporting Information

Trifluoromethyl functionalized polyindoles: Electrosyntheses, characterization, and improved capacitive performance

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1. Calculation of the polymer mass

To obtain the accurate mass of each polymer material, the current efficiency (η) of polymerization (i.e., the charge consumed by growth of the polymer film with respect to the total charge passed through the cell) was measured along with the weight (W_p) of the polymer (in the de-doped state) deposited on the electrode according to equation (1).[1–3] Note that W_p was obtained by weighing the polymer mass due to the use of a large electrode (2 cm × 2 cm) as the working electrode.

$$\eta = [(nFW_p/M)/Q] \times 100\% \qquad (1)$$

where, n is the number of electrons consumed by the reaction of one molecule (here n is 2), F is Faraday constant (96,485 C mol^{-1}), Q is the integrated charge passed through the cell during film growth, M is the molar mass of the monomer.

The mass (W) of polymers deposited on the small electrode can be accurately calculated by the equations (2,3).[1–5]

$$W = \frac{(\eta Q_d)(M)}{FZ} \qquad (2)$$

$$f = \frac{2Q_0}{\eta Q_d - Q_0} \qquad (3)$$

where, Z is the number of electrons transferred per monomer attached to the polymer, in which $Z = 2 + f$. f is the doping levels of polymer films. ηQ_d is the charge used for the polymer film growth and Q_o is the total charge of oxidized species in the polymer films.

To compare the electrochemical properties of different polymers, the mass of polymer films in this work was controlled as 3.3 μg according to the calculated current efficiencies and doping levels (Table S1).

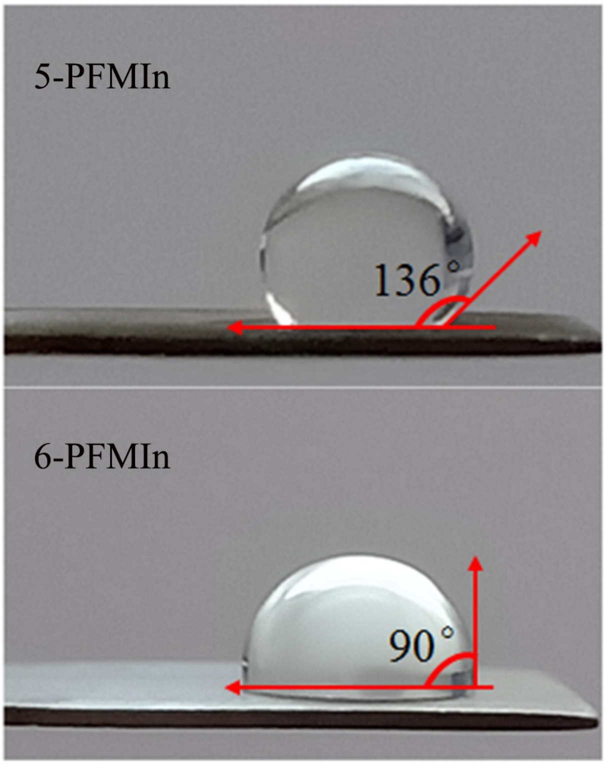

Figure S1. Contact angles of 5-PFMIn and 6-PFMIn.

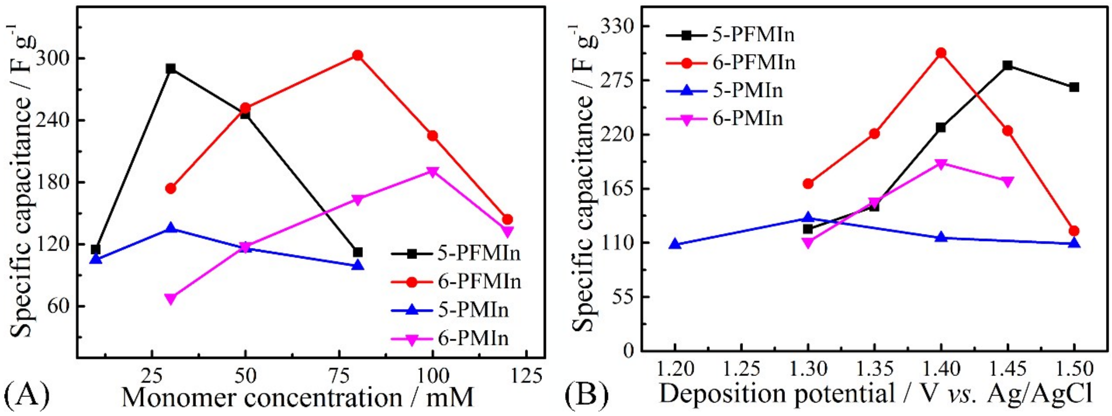

Figure S2. Specific capacitance of 5-FMIn, 6-FMIn, 5-MIn and 6-MIn as the function of monomer concentration (A) and deposition potential (B) used to preparation of corresponding polymers.

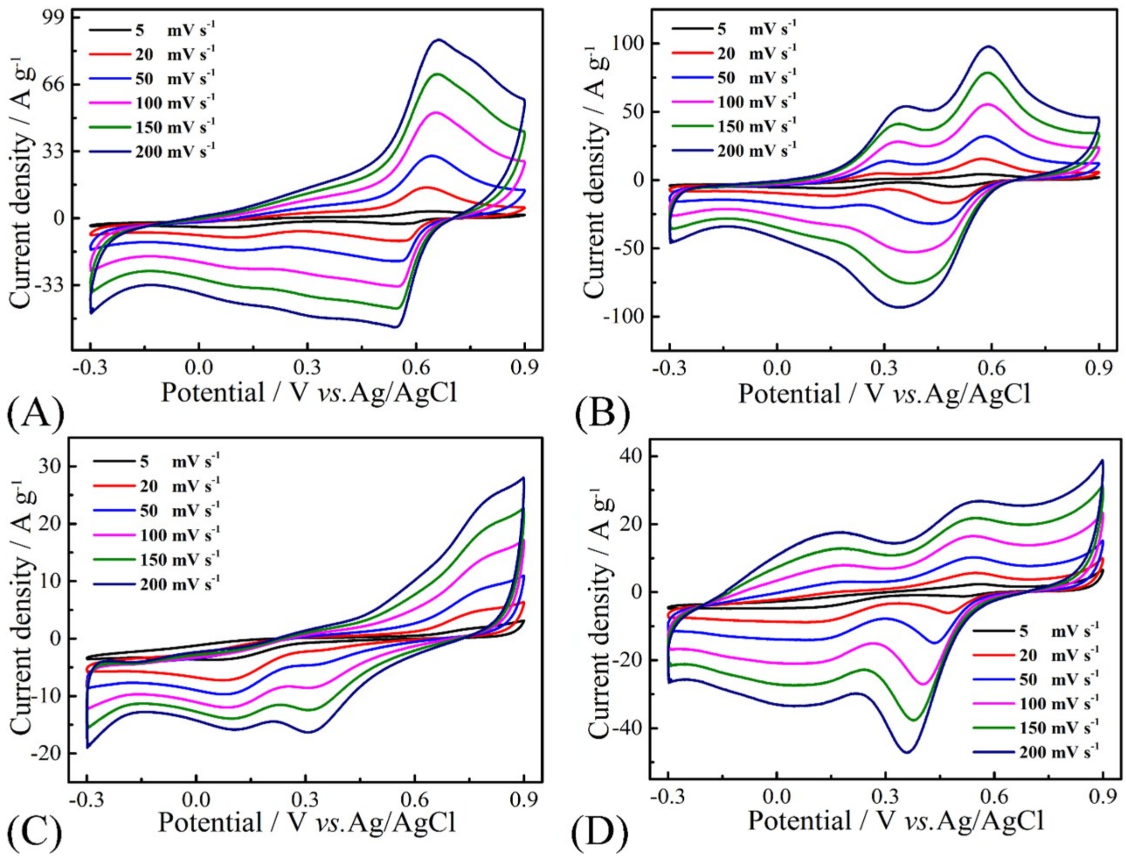

Figure S3. Cyclic voltammetry curves of 5-PFMIn (A), 6-PFMIn (B), 5-PMIn (C) and 6-PMIn (D) with various scan rates in the range of 5 to 200 mV s^{-1} in 1 M H_2SO_4 aqueous solution.

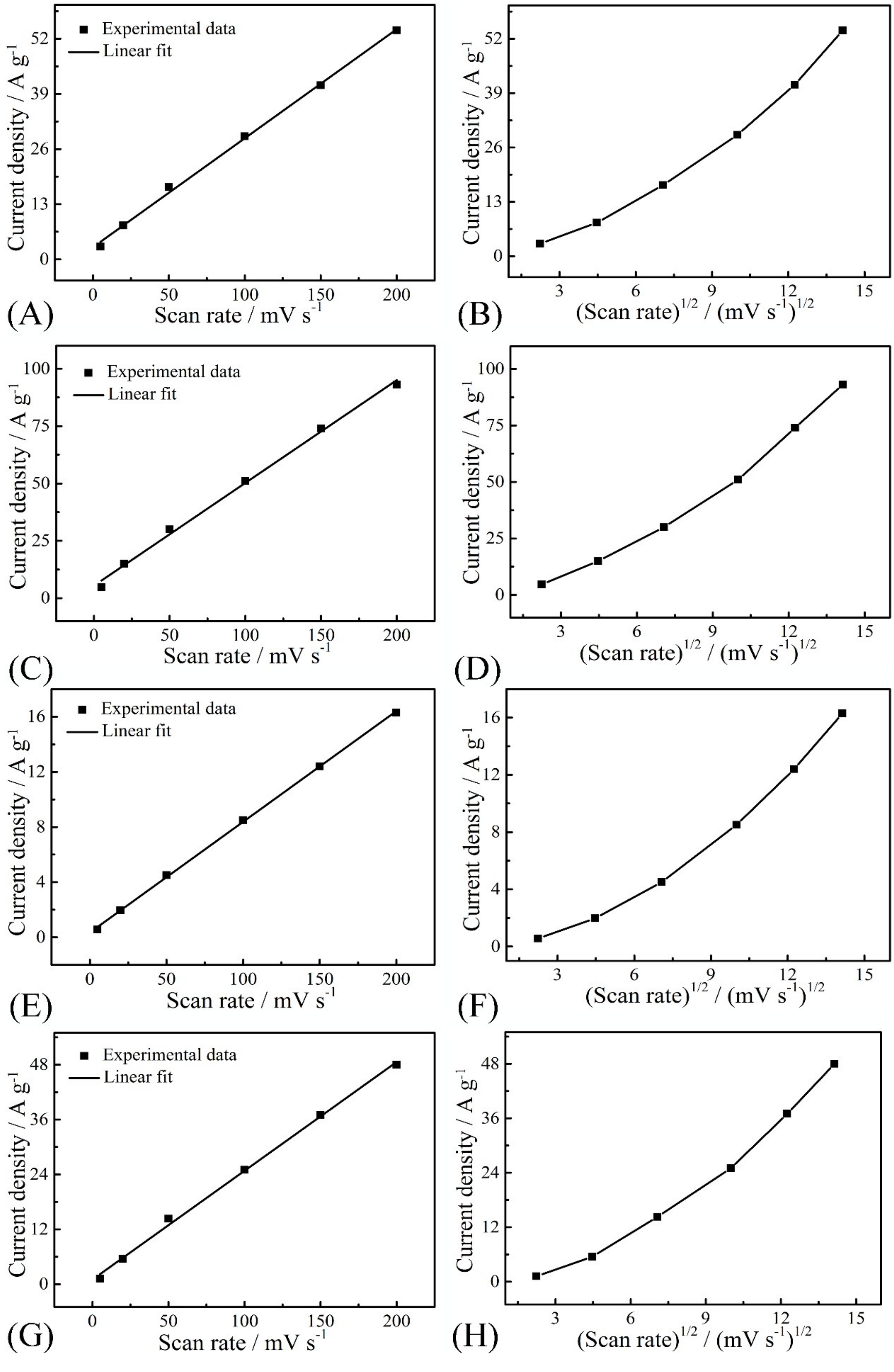

Figure S4. Cathodic current as function of scan rate and the square root of scan rate of 5-PFMIn (A) (B), 6-PFMIn (C) (D), 5-PMIn (E) (F) and 6-PMIn (G) (H).

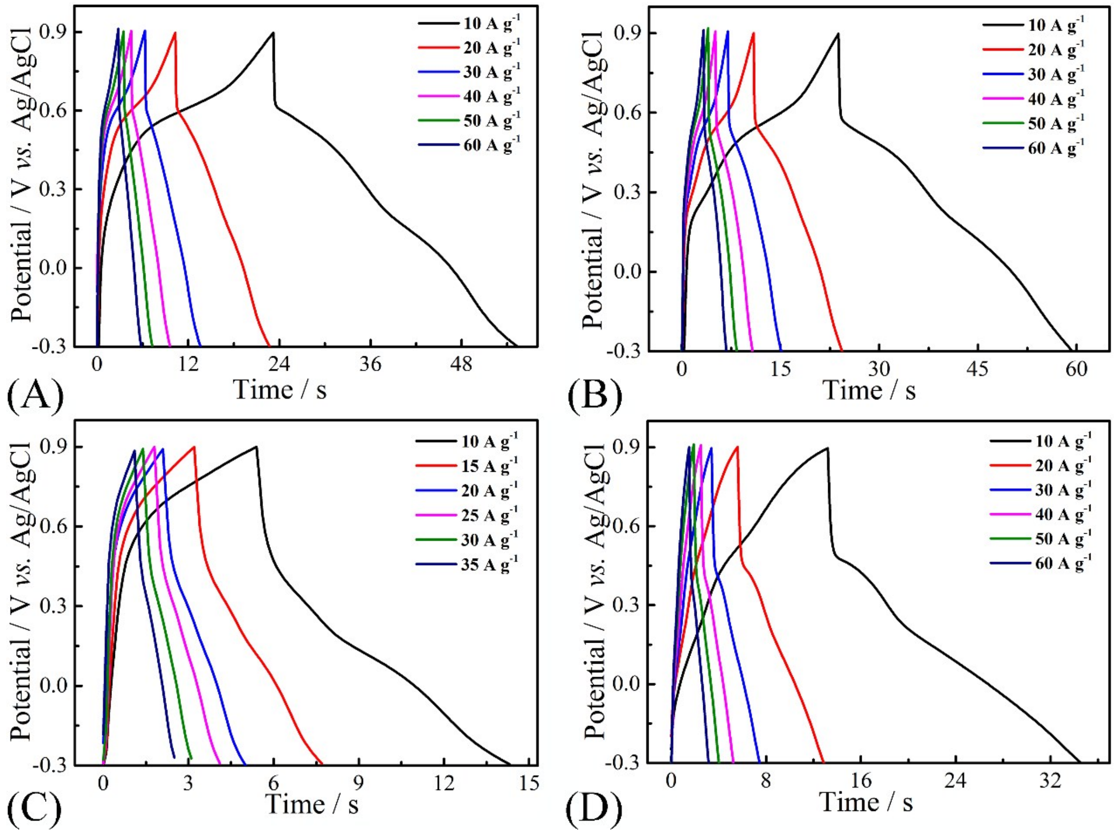

Figure S5. Galvanostatic charge/discharge of 5-PFMIn (A), 6-PFMIn (B), 5-PMIn (C) and 6-PMIn (D) at different current densities in 1 M H_2SO_4 aqueous solution.

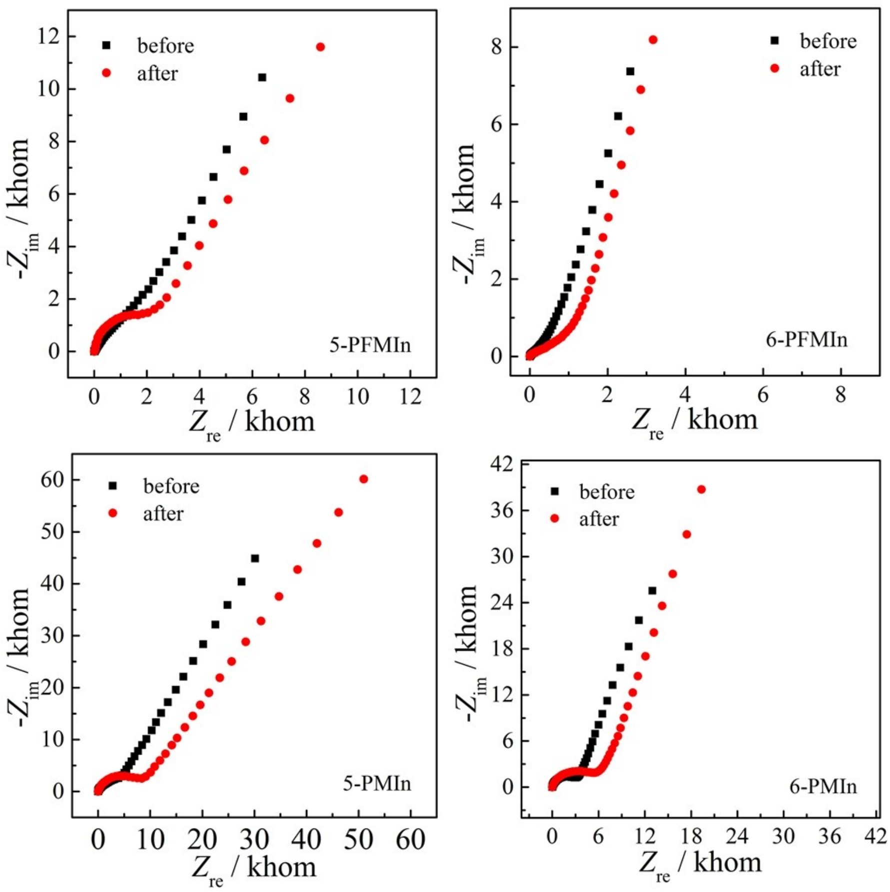

Figure S6. Nyquist plots of 5-PFMIn, 6-PFMIn, 5-PMIn and 6-PMIn before and after the cycling 5000 times in 1 M H_2SO_4 aqueous solution.

Table S1 The calculated values for the electropolymerization.

	5-PFMIn	6-PFMIn	5-PMIn	6-PMIn
η / %	72	75	70	64
f	0.14	0.18	0.18	0.12

References

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