Supporting Information for:

Cobaltocenium-containing polybenzimidazole polymers for alkaline anion exchange membrane applications

Nanjun Chen, Hong Zhu*, Yuhao Chu, Rui Li, Yang Liu, Fanghui Wang
State Key Laboratory of Chemical Resource Engineering, Institute of Modern Catalysis, Department of Organic Chemistry, School of Science, Beijing University of Chemical Technology, Beijing, 100029, P. R. China Tel:+86-10-64444919;
E-mail: zhuho128@126.com

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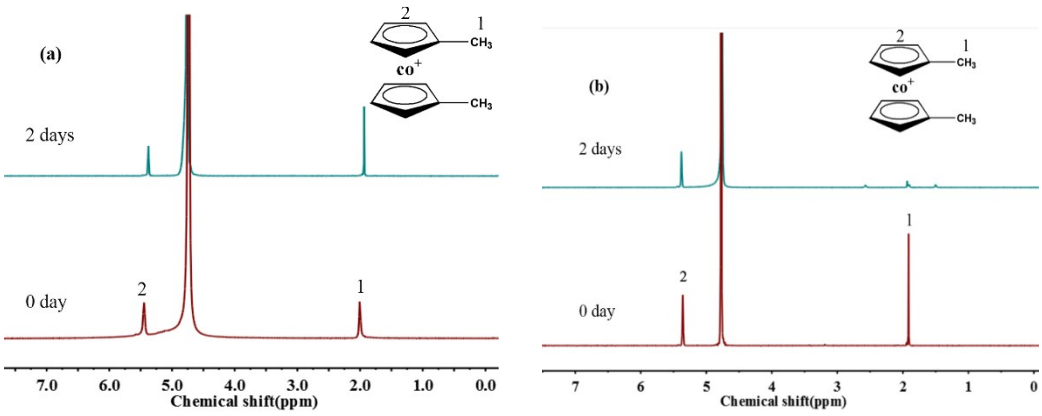


Fig. S1: ^{1}HNMR spectra evidence for H-D exchange of $DMCp_2Co^+PF_6^-$ in 1mol/L (a) H_2O/KOH and (b) D_2O/KOH at 80℃ after 2 days: It can be seen that the ^{1}H signal belongs to -CH_3 (2.02 ppm) in D_2O/KOH decreases. But the ^{1}H signals for H_2O/KOH show no change, indicating that the H-D exchange occurs mainly on –CH_3.

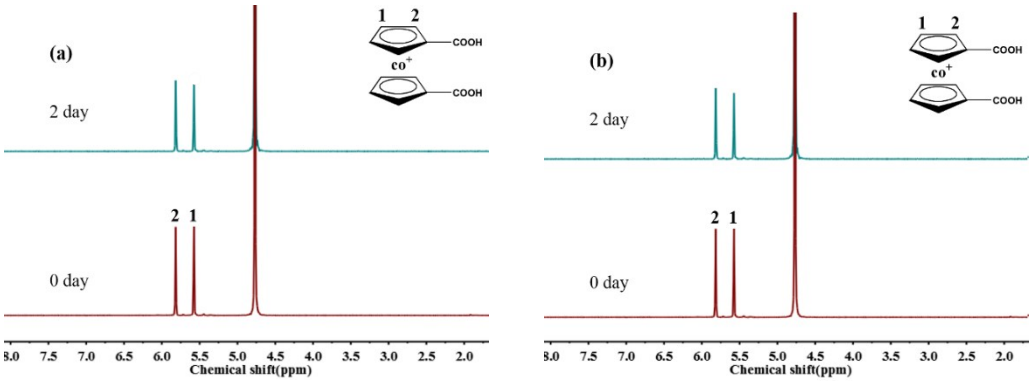
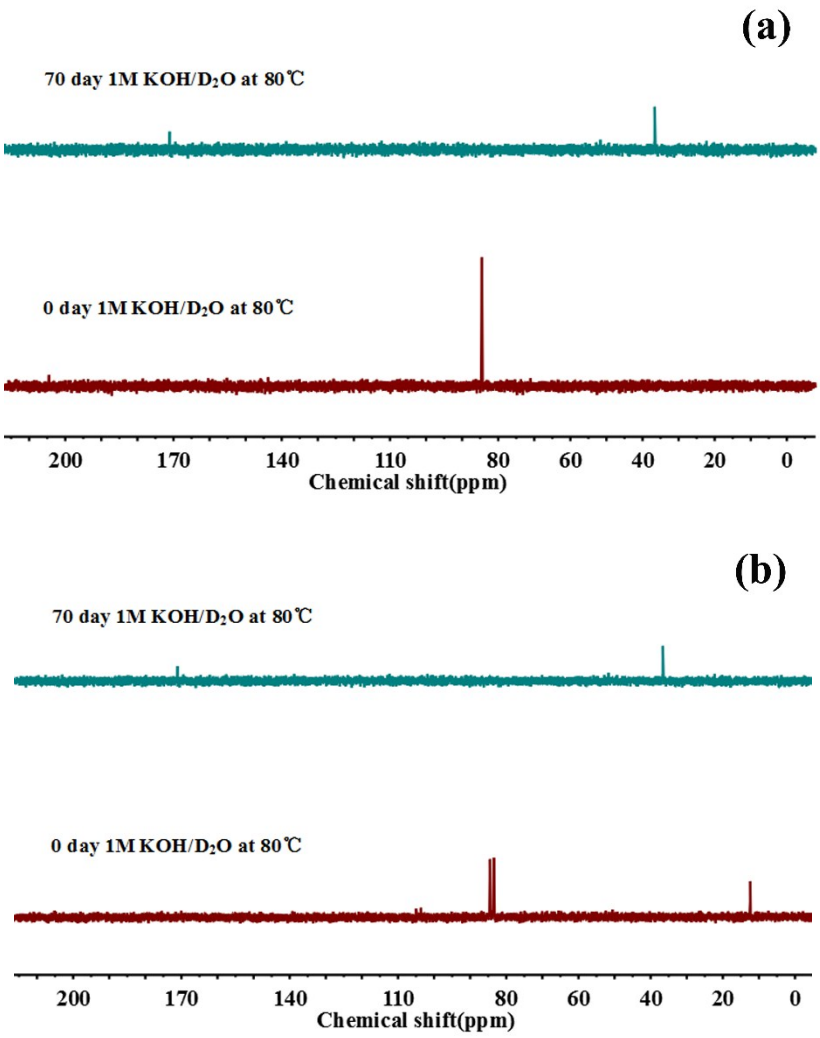


Fig. S2: ^{1}HNMR spectra evidence for H-D exchange of $DCCp_2Co^+PF_6^-$ in 1mol/L (a) H_2O/KOH and (b) D_2O/KOH at 80℃ after 2 days: There is no difference between the ^{1}HNMR spectra in (a) and (b), indicating that there is no H-D exchange in $DCCp_2Co^+PF_6^-$



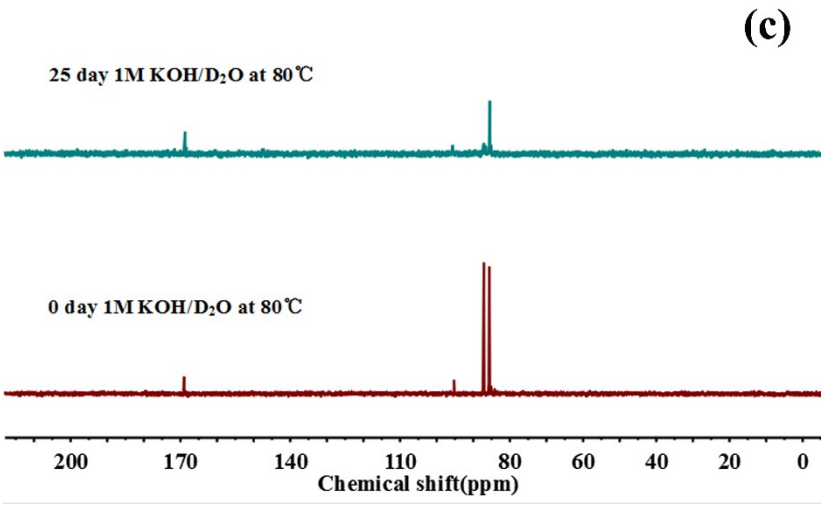
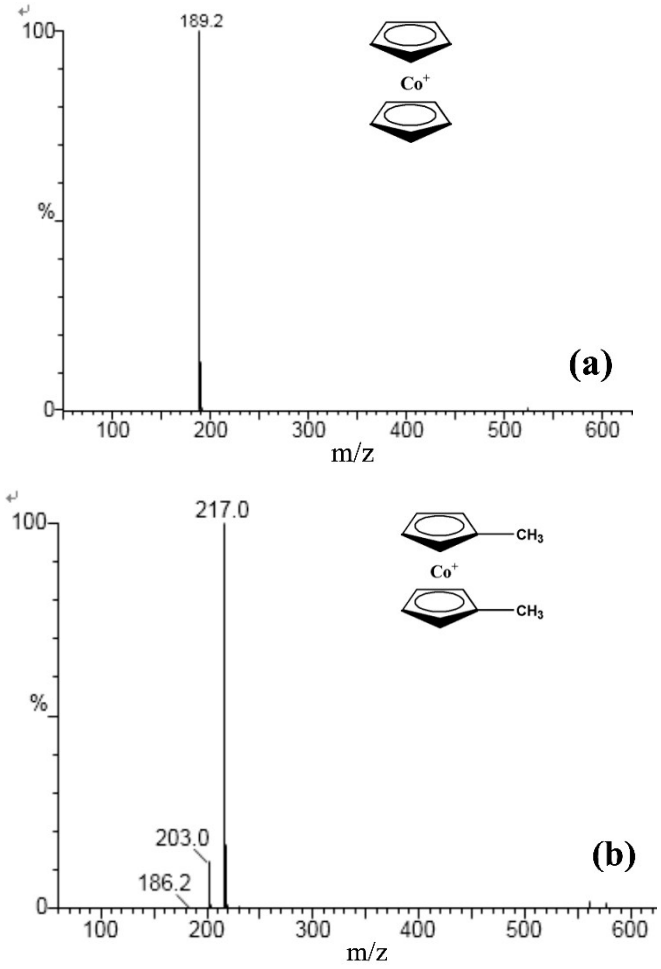


Fig. S3: ^{13}CNMR spectra of (a) Cp_2Co^+, (b) $DMCp_2Co^+PF_6^-$, and (c) $DCCp_2Co^+PF_6^-$ in 1 M KOH/D_2O at 80℃ at various times.



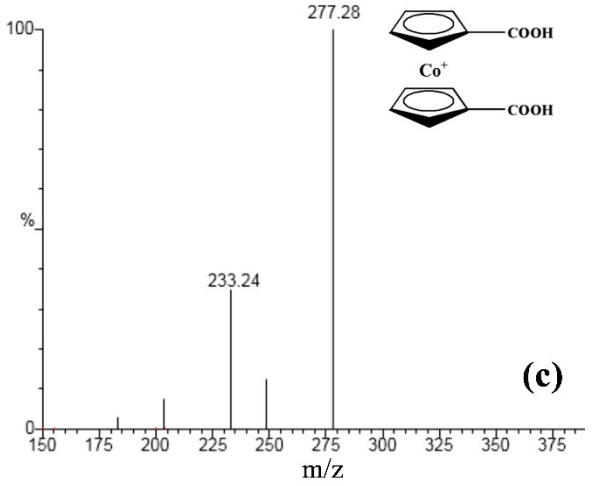


Fig. S4: Mass spectra of (a) Cp_2Co^+, (b) $DMCp_2Co^+PF_6^-$, and (c) $DCCp_2Co^+PF_6^-$

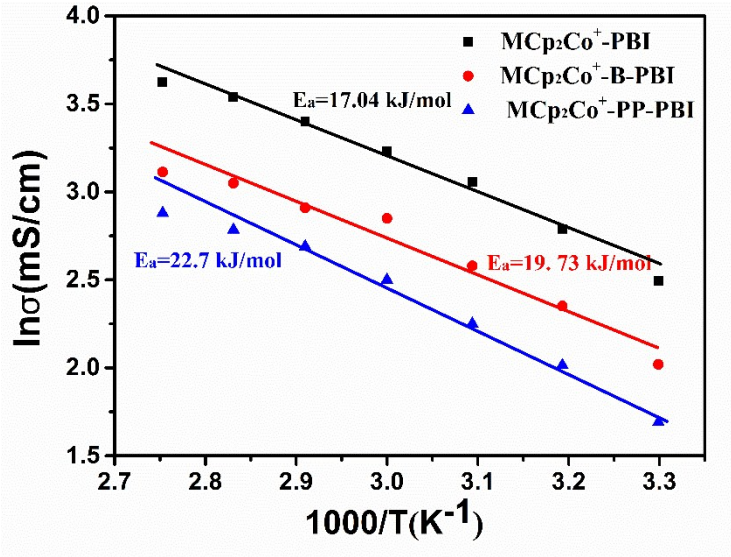


Fig. S5: Arrhenius plots of hydroxide conductivity of cobaltocenium-containing polybenzimidazole membranes.

The calculation of the degree of degradation of cobaltocenium cations in alkaline medium

The ^{1}HNMR spectra were used to estimate the degree of degradation of the three cobaltocenium cations in alkaline medium. For example, as shown in Fig. 3(a). The degree of degradation can be calculated by the relative integrated intensities of the indicated ^{1}H resonances. $(S_a+S_b+S_c+S_d+S_e)/S_1$ can be used to estimate the degree of degradation of Cp_2Co^+ in Fig. 3(a), where S_a, S_b, S_c, S_d, S_e and S_1 are the relative integrated intensities of the peaks marked with a, b, c, d, e, and 1, respectively.