Electronic Supplementary Information

Heterogeneous Catalyst Based on Built-in N-Heterocyclic Carbenes with High Removability, Recoverability and Reusability for Ring-opening Polymerization of Cyclic Esters

Wen Liu, Guo-Qiang Tian, Dan-Dan Yang, Gang Wu, Si-Chong Chen, Yu-Zhong Wang**

National Engineering Laboratory of Eco-Friendly Polymeric Materials (Sichuan), State Key Laboratory of Polymer Materials Engineering, College of Chemistry, Sichuan University, Chengdu, 610064, China.

*Corresponding Author: chensichong@scu.edu.cn (S. C. Chen) and yzwang@scu.edu.cn (Y. Z. Wang)

Diameter distribution of PS-CH_2Cl and PS-$PrIm^+Cl^-$ microsphere

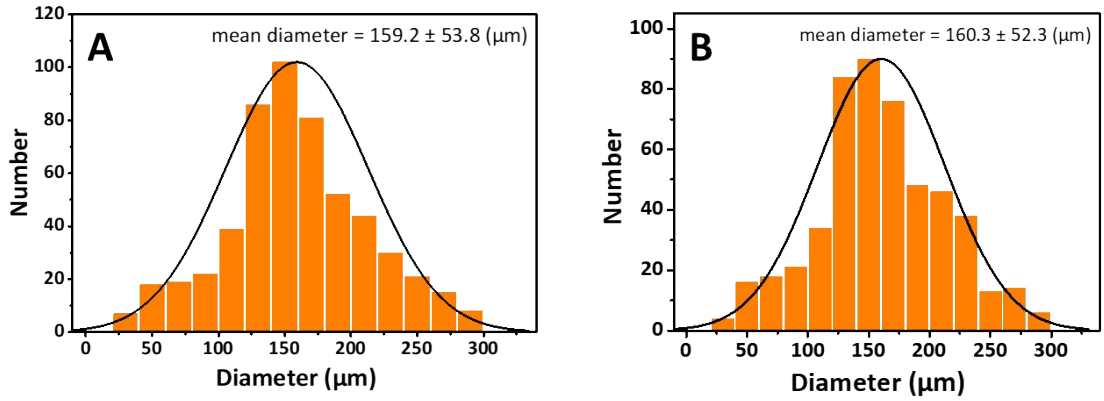

Fig. S1 Diameter distribution of PS-CH_2Cl and PS-$PrIm^+Cl^-$ microsphere. (The number of microspheres exceeds 500).

The separation of catalyst and product by filtration

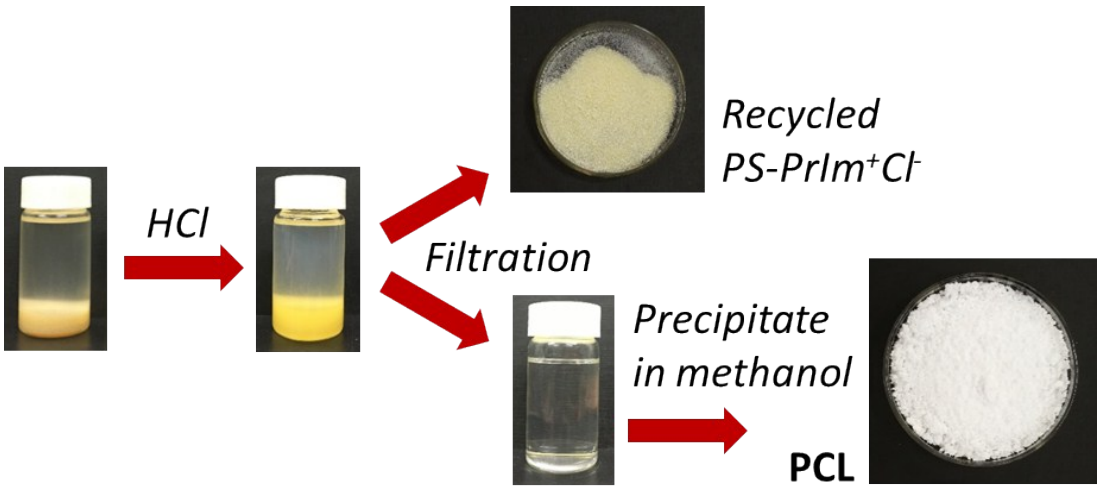

Fig. S2. The purification of ROP products and recycling of the catalysts.

The whiteness of samples

Table S1. The whiteness of PCL prepared with different catalysts

catalyst	termination agent	L*[a]	a*[b]	b*[c]	R457[d]
NHCs	HCl	96.09	-0.46	2.41	87.44
NHCs	H_2O	97.45	-0.36	1.57	91.22
NHCs	$CHCl_3$	94.49	-1.45	10.1	75.39
PS-NHCs	HCl	98.01	-0.07	0.57	94.15
$Sn(Oct)_2$	--	97.83	-0.53	1.26	93.22
Commercial PCL (DG-COH150)		93.85	-0.1	0.61	81.90

[a] The brightness of the sample.

[b] The red and green phase of the samples.

[c] The yellow and blue phase of the samples.

[d] The whiteness of samples.

Thermal stability of microspheres

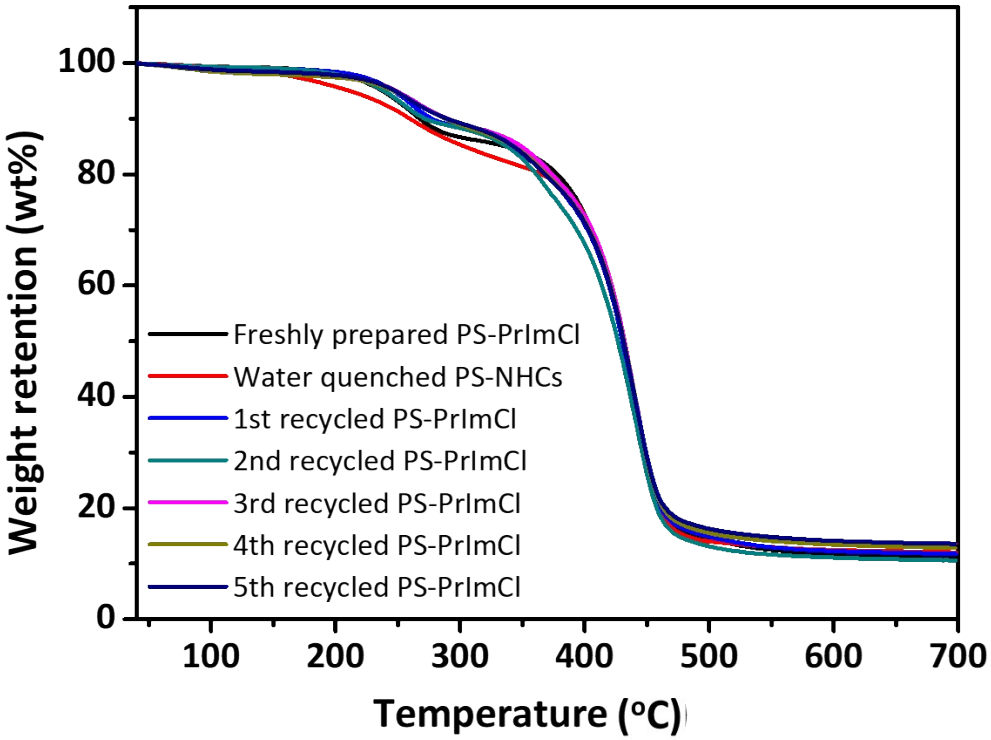

Fig. S3. The TG curves of microspheres.

N_2 sorption isotherms of recycled PS-PrIm$^+$Cl$^-$ microsphere

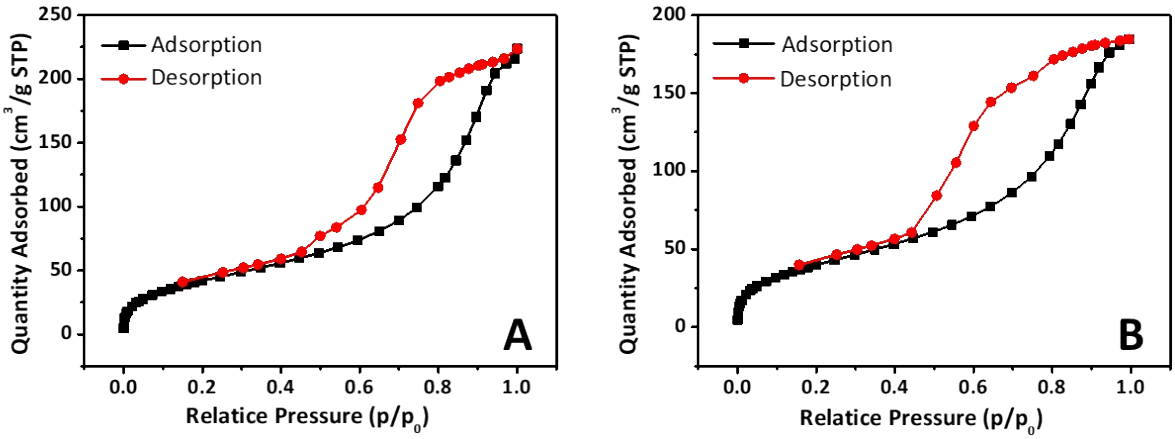

Fig. S4. N_2 sorption isotherms of 1st (A) and 5th (B) recycled PS-PrIm$^+$Cl$^-$ microspheres

Table S2 Textural parameters of 1st and 5th recycled PS-PrIm$^+$Cl$^-$ microspheres with HCl

Sample	S[a]/m^{2}g^{-1}	V[b]/cm^{3}g^{-1}	Pore size[c]/nm
1st recycled PS-PrIm$^+$Cl$^-$	155	0.33	5.89
5th recycled PS-PrIm$^+$Cl$^-$	149	0.29	4.83

[a] Surface area calculated from the nitrogen adsorption isotherm using the BET method.

[b] Single point pore volume calculated at relative pressure P/P_0 of 0.99.

[c] BJH method from desorption branch.