Supplementary information

Improved catalytic performance of lipase in non-aqueous conditions by entrapment into alkyl-functionalized mesoporous silica

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Small scale fermentation to produce lipase r27RCL:

A single colony of recombinant *P. pastoris* GS115 strain harboring recombinant plasmid pPIC9K-*proRCL* was picked and inoculated into 25 mL BMGY (1% yeast extract, 2% peptone, 100 mM potassium phosphate buffer with pH 6.0, 1.34% yeast nitrogen base, 4×10^{-5}% biotin, 1% glycerol) medium, and grew at 28-30 ℃ in a shaking incubator (250-300 rpm) until the culture reached an OD_{600} of 4.0. The cells were harvested, and was fully transferred into 100 mL BMMY (1% yeast extract, 2% peptone, 100 mM potassium phosphate buffer pH 6.0, 1.34% yeast nitrogen base, 4×10^{-5}% biotin, and 0.5% methanol) medium to obtain a cell suspension with OD_{600} = 1.0. The cells were grown for another 5 d and expression of lipase was induced by methanol at a final concentration of 1% added every 24 h. The culture supernatants were lyophilized to obtain the enzyme powder.

Table S1. Parameters of immobilized lipase r27RCL.

Sample	Loading capacity (mg r27RCL/g Support)	Esterification activity (μmol/min/mg protein)	Immobilization yield (%)	Hydrolytic activity (U/mg protein)
r27RCL	/	0.6	/	162
pure MPS-r27RCL	39	2.3	29	69
MPS-C3-r27RCL	42	8.4	32	74
MPS-C8-r27RCL	46	51	35	106
MPS-C18-r27RCL	51	61.2	38	123

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1 Contributed equally to this work

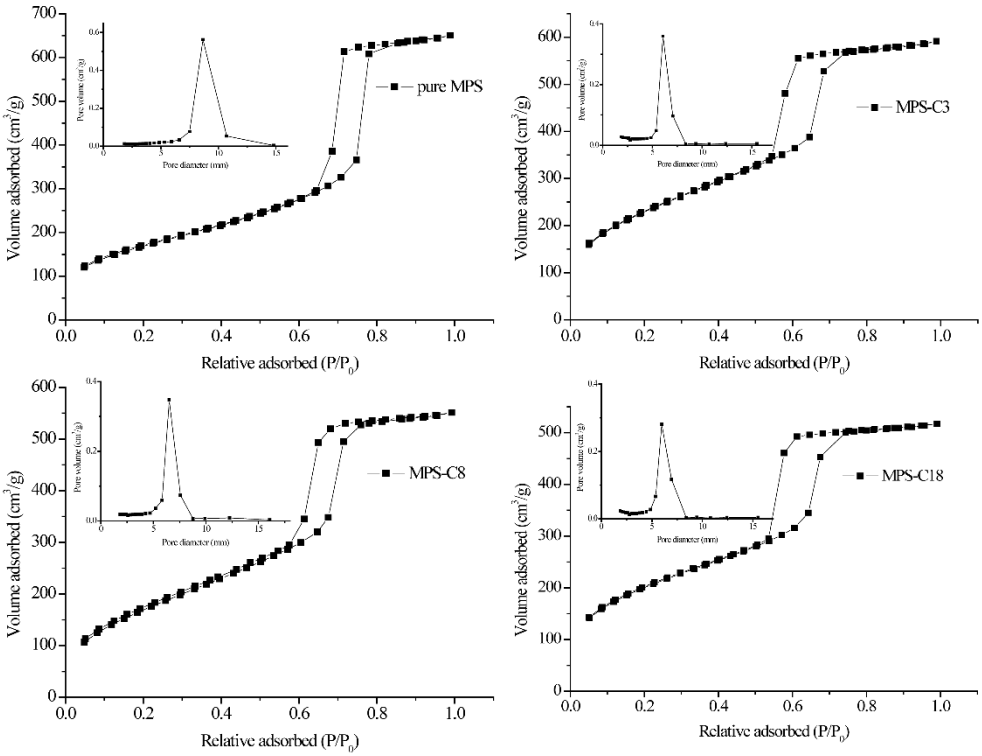

Fig. S1 Nitrogen adsorption-desorption isotherms and pore-size distribution for pure MPS, MPS-C3, MPS-C8 and MPS-C18

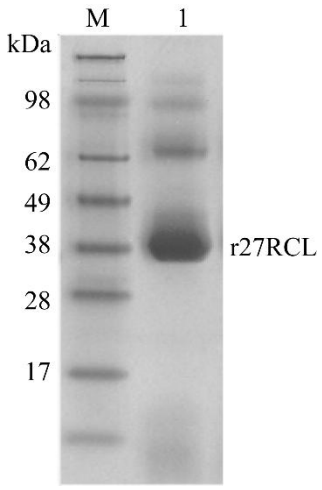

Fig. S2 SDS-PAGE of crude r27RCL. M: marker. 1: crude r27RCL.

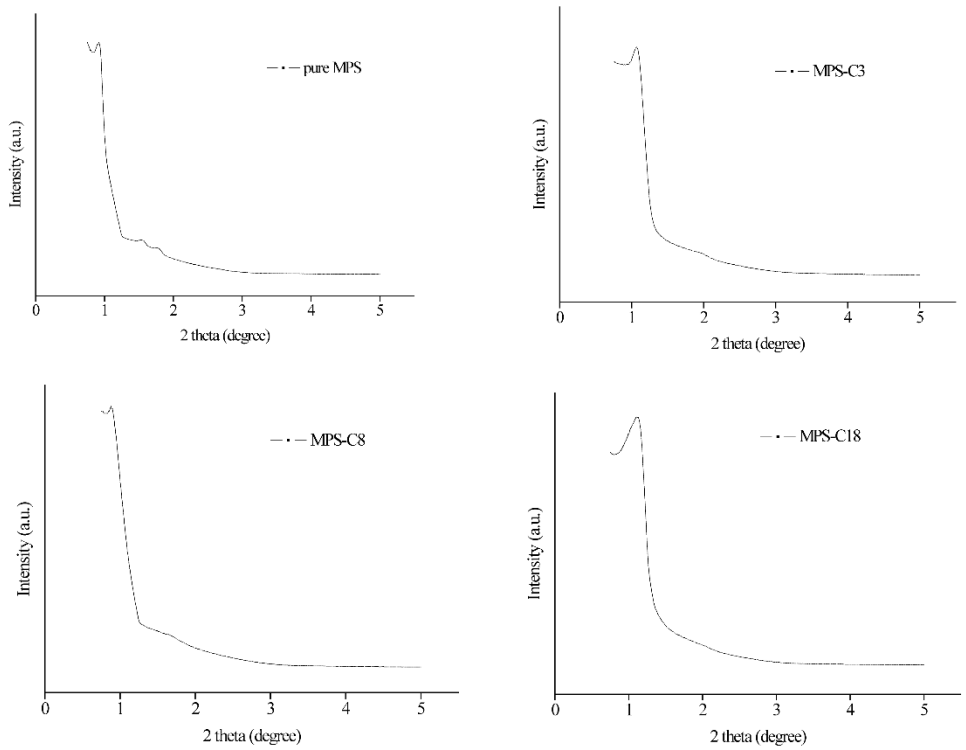

Fig. S3 Low-angle XRD patterns of pure MPS, MPS-C3, MPS-C8 and MPS-C18

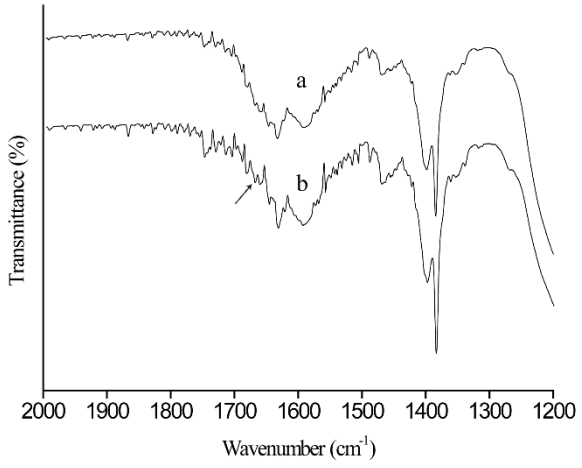

Fig. S4 FT-IR spectra of (a) MPS-C18, (b) MPS-C18-r27RCL

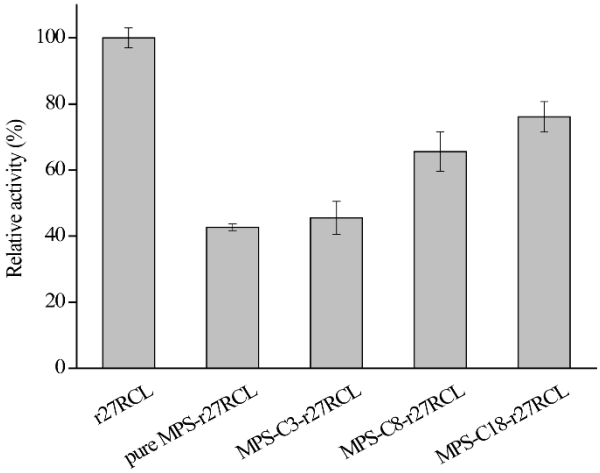

Fig. S5 Comparison of relative activities of r27RCL immobilized intomesoporous silica materials for hydrolytic reactions of pNPB

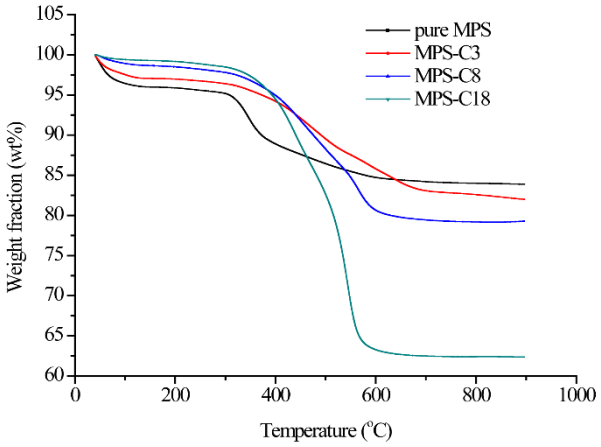

Fig. S6 TG curves of pure MPS, MPS-C3, MPS-C8, and MPS-C18