

Supporting Information

Comparison of hydrophobic and untreated material.

The untreated and hydrophobic material was compared under the SEM microscope.

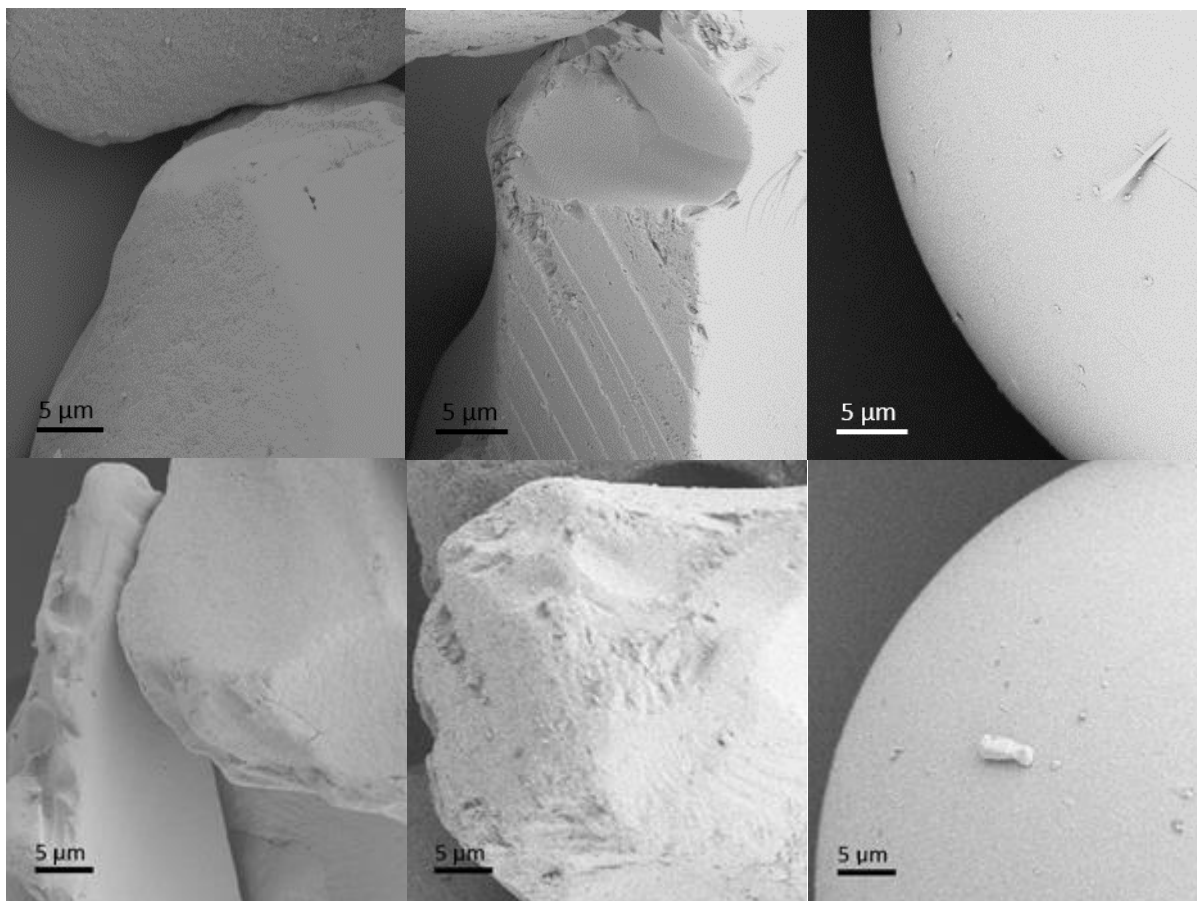


Figure 1 Top left to bottom right **150Å untreated material, 60Å untreated material, nonporous material, 150Å hydrophobic material, 60Å hydrophobic material, non-porous hydrophobic material.**

BET measurements

Sample	BET surface [m ² /g] (Replica Nr.)	Average [m ² /g]	Error [m ² /g]
150Å hydrophobic	207 (1) 194 (2) 197 (3)	200	5.9
150Å SNFs	172 (1) 148 (2) 166 (3)	162	10.3
60Å hydrophobic	182 (1) 176 (2) 198 (3)	185	8.9
60Å SNFs	133 (1) 140 (2) 126 (3)	133	5.7
No pores hydrophobic	0.04	0.04	-
No pores SNFs	0.5 (1) 0.7 (2)	0.6	0.1

Table 1 Measured BET values untreated materials.

Calculation of the surface area of the nonporous control sample

Density spheres			Suface per gramm		
Density water 22°C	0.99772	g/mL	Diameter	75	µm
Weight water	9.3159	g	Diameter	0.000075	m
Weight beads	1.3515	g	Pi	3.141593	
Combined vol.	10	mL	Surface 1 sphere	1.77*10 ⁻⁸	m ²
Volume water	9.337189	mL	Volume 1 sphere	2.21*10 ⁻¹³	m ³
Volume beads	0.662811	mL	Weight 1 sphere	4.5*10 ⁻¹⁰	kg
Density	2.039042	g/mL	Spheres per gram	2220196	1/g
Density	2039.042	kg/m ³	Surface per gram	0.039234	m ² /g

Table 2 Step by step calculation of the surface area of the nonporous material

BCR measurements of different carrier materials

Sample	Immobilized CalB [% w/w] (Replica Nr.)	Average [% w/w]	Error [% w/w]
150Å hydrophobic	3.63 (1) 3.87 (2) 4.05 (3)	3.85	0.17
150Å SNFs	3.34 (1) 3.68 (2) 3.44 (3)	3.48	0.14
60Å hydrophobic	3.27 (1) 3.47 (1) 3.60 (1)	3.45	0.14
60Å SNFs	3.37 (1) 3.19 (2) 3.32 (3)	3.29	0.07
No pores hydrophobic	2.36 (1) 2.52 (2) 2.72 (3)	2.53	0.15
No pores SNFs	2.61 (1) 2.32 (2) 2.83 (3) 2.78 (4)	2.64	0.20

Table 3 Measured immobilizations of CalB on different carrier materials.

Activity measurements of different carrier materials

Sample	Activity [U] (Replica Nr)	Catalyst used [mg]	Average [U]	Error [U]
150Å hydrophobic	673 (1) 972 (2) 827 (3)	2.7 2.6 2.5	824	122
150Å SNFs	1157 (1) 1565 (2) 1465 (3)	2.9 2.7 2.9	1395	173
60Å hydrophobic	856 (1) 788 (1) 1085 (1) 964 (1)	2.8 2.8 2.8 2.8	923	112
60Å SNFs	1931 (1) 1820 (2) 1725 (3)	3 3.1 3	1825	84
No pores hydrophobic	286 (1) 190 (2) 330 (3)	11 4 3.7	269	58
No pores SNFs	2145 (1) 2170 (2) 1828(3) 2019(4)	3.6 3.1 3.7 3.6	2040	135

Table 4 Activities and catalyst amount used.

Variation of the enzyme loading BRC assay

Sample	Immobilized CalB [% w/w] (Replica Nr.)	Average [% w/w]	Error [% w/w]
no pores SNFs (8 mg)	2.61 (1) 2.32 (2) 2.83 (3) 2.78 (4)	2.64	0.20
no pores SNFs (4 mg)	1.07 (1) 1.22 (1) 1.19 (1) 1.49 (2) 1.29 (2) 1.20 (2)	1.24	0.13
no pores SNFs (2 mg)	0.69 (1) 0.64 (2) 0.67 (3)	0.66	0.02
no pores SNFs (1 mg)	0.30 (1) 0.39 (2) 0.33 (2) 0.25 (2)	0.31	0.06

Table 5 Measured immobilizations of CalB.

Variation of the enzyme loading activity assay

Sample	Activity [U]	Catalyst used [mg]	Average [U]	Error [U]
no pores SNFs (8 mg)	2145 (1) 2169 (2) 1827 (3) 2018 (4)	3.6 3.1 3.7 3.6	2040	136
no pores SNFs (4 mg)	2549 (1) 2472 (1) 2171 (2) 2374 (2)	3.7 3.5 3.5 3	2391	142
no pores SNFs (2 mg)	2939 (1) 3439 (2) 3008 (3)	3.3 7.6 9.6	3129	221
no pores SNFs (1mg)	2308 (1) 2504 (1) 2567 (2)	8.6 8.6 7.8	2486	98

Table 6 Activities and catalyst amount used.

39 Approximation of the CalB layers over the BET surface

Sample	Enzyme per silica [g/g]	mol enzyme/g silica [mol/g]	enzymes/g silica [1/g]	Surface all enzymes on 1g Silica [m ² /g]	BET surface silica [m ² /g]	Layers of BET surface covered by enzyme
no pores SNFs (8mg)	0.0264	7.89×10^7	4.75×10^{17}	9.50	0.6	15.84
no pores SNFs (4mg)	0.0124	3.72×10^7	2.24×10^{17}	4.47	0.6	7.46
no pores SNFs (2mg)	0.0066	1.99×10^7	1.20×10^{17}	2.40	0.6	3.99
no pores SNFs (1mg)	0.003	9.40×10^8	5.66×10^{16}	1.13	0.6	1.89
Novozyme	0.2	5.99×10^6	3.61×10^{18}	72.1	150	0.48

Table 7 detailed calculation of the layers over the entire BET surface. CalB area assumed to be 40Å x50Å.
Molecular weight of CalB 33.4 kDa.

42 Activity of Novozyme

Sample	Activity [U]	Catalyst used [mg]	Average [U]	Error [U]
Novozyme 435	3381 2706 2932 3274	3 3.5 3.2 3.1	3073	269

Table 8 Activities and catalyst amount used for comparison measurements with Novozyme 435.