

Supplementary Materials:

1.1 Reagents

The main reagents used in the experiment are shown in Table S1.

Table S1. Experimental reagents.

Reagents	Specifications	Suppliers
Na ₂ CO ₃	AR	Aladdin Reagent Shanghai Co., Ltd
HCl	AR	China National Pharmaceutical Group Chemical Reagent Co., Ltd
C ₉ H ₁₂	AR	
NaOH	AR	
NH ₃ ·H ₂ O	AR	Aladdin Reagent Shanghai Co., Ltd
CH ₃ CH ₂ OH	AR	Aladdin Reagent Shanghai Co., Ltd
CH ₃ Si (CH ₃ O) ₃	98%	Aladdin Reagent Shanghai Co., Ltd
CH ₃ (CH ₂) ₃ CH ₃	AR	Aladdin Reagent Shanghai Co., Ltd
((CH ₃) ₃ Si) ₂ O	98%	Aladdin Reagent Shanghai Co., Ltd
C ₆ H ₁₆ O ₃ Si	>98%	Aladdin Reagent Shanghai Co., Ltd

1.2 Equipment

The model numbers of the equipment used for testing are shown in Table S2.

Table S2. Main experimental equipment.

Equipment	Model	Manufacturer
X-ray diffraction spectrometer	XD-3X	Beijing Puxi General Instrument Co., Ltd
Physical adsorption analyzer	ASAP2020	Mike Company in the United States
FT-IR	VERTEX70	Bruker, Germany
Thermal conductivity meter	TC-3000E	Xi'an Xiayi Electronic Technology Co., Ltd
Contact angle tester	CA100B	Shanghai Yingnuo Precision Instrument Co., Ltd

Table S3. Orthogonal test results analysis table.

Item	Level	A	B	C	D
K	1	117.68	103.27	114.94	108.06
	2	118.25	118.35	110.08	116.44
	3	103.05	117.36	113.96	114.48
k	1	39.23	34.42	38.31	36.02
	2	39.42	39.45	36.69	38.81
	3	34.35	39.12	37.99	38.16
Optimal Level		2	2	1	2
Range		5.07	5.03	1.62	2.79
Number of levels		3	3	3	3
Number of repetitions per level		3	3	3	3

Note: K represents the sum of the desilication rates under the same level and condition in the experiment. Meanwhile, k represents the average of the summed desilication rates. Range indicates the range of the factors in the experiment, calculated as follows for the same factor

$$(k_1-k_3): R = k_{\max} - k_{\min}.$$