

Supplementary Information

SULFONIC ACID FUNCTIONALIZED SILICA NANOPARTICLES AS CATALYSTS IN THE ESTERIFICATION OF LINOLEIC ACID

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Table S1. Core-level binding energies (BE) for SiO₂ and functionalized SiO₂ obtained by curve fitting of XPS spectra. ^{a)}

Material	Element	BE (eV)					
SiO ₂	C 1s	284.6 (1.5)	286.5 (1.5)	288.9 (1.5)			
	O 1s	533.0 (1.8)	535.3 (1.8)				
	Si 2p	103.4 (1.4)	104.0 (1.4)				
SiO ₂ _MPTMS	C 1s	284.6 (1.5)	285.4 (1.5)	286.7 (1.5)	288.2 (1.5)		
	O 1s	530.3 (1.6)	532.6 (1.6)				
	Si 2p	103.2 (1.5)	103.8 (1.5)				
	S 2p	163.4 (1.3)	164.6 (1.3)	168.5 (1.3)	169.7 (1.3)		
SiO ₂ _MPTMS_SO ₃ H-1	C 1s	284.6 (1.8)	286.2 (1.8)	288.8 (1.8)	291.2 (1.8)		
	O 1s	530.6 (1.5)	532.8 (1.5)	534.0 (1.5)	535.8 (1.5)		
	Si 2p	103.5 (1.6)	104.1 (1.6)	106.2 (1.6)	106.8 (1.6)		
	S 2p	168.7 (1.4)	169.9 (1.4)				
SiO ₂ _MPTMS_SO ₃ H-2	C 1s	284.6 (1.6)	285.6 (1.6)	286.9 (1.6)	288.9 (1.6)		
	O 1s	530.5 (1.6)	532.7 (1.6)	534.1 (1.6)			
	Si 2p	103.4 (1.6)	104.0 (1.6)				
	S 2p	169.0 (1.6)	170.2 (1.6)				
SiO ₂ _MPTMS_S-SO ₃ H-3	C 1s	284.6 (1.6)	286.1 (1.6)	288.5 (1.6)	291.3 (1.6)		
	O 1s	530.8 (1.5)	532.9 (1.5)	534.3 (1.5)			
	Si 2p	103.5 (1.4)	104.1 (1.4)				
	S 2p	164.0 (1.6)	165.2 (1.6)	169.5 (1.6)	170.7 (1.6)		
SiO ₂ _PhTES_SO ₃ H-4a	C 1s	284.6 (1.5)	285.5 (1.5)	286.6 (1.5)	287.8 (1.5)	289.3 (1.5)	291.3 (1.5)
	O 1s	530.5 (1.6)	532.7 (1.6)	533.9 (1.6)			
	Si 2p	103.5 (1.6)	104.1 (1.6)	105.4 (1.6)	106.0 (1.6)		
	S 2p	169.1 (2.1)	170.3 (2.1)				
SiO ₂ _PhTMS_SO ₃ H-4b	C 1s	284.6 (1.7)	286.5 (1.7)	288.9 (1.7)	291.2 (1.7)		
	O 1s	530.6 (1.7)	532.7 (1.7)	534.4 (1.7)			
	Si 2p	102.1 (1.5)	102.7 (1.5)	103.3 (1.4)	103.9 (1.4)		
	S 2p	169.6 (1.8)	170.8 (1.8)				
SiO ₂ _PhTES_SO ₃ H-5a	C 1s	284.6 (1.4)	285.7 (1.4)	286.9 (1.4)	289.1 (1.4)	291.5 (1.4)	
	O 1s	533.0 (1.5)	534.2 (1.5)	535.6 (1.5)			
	Si 2p	103.6 (1.5)	104.3 (1.5)				
	S 2p	169.8 (2.0)	170.8 (2.0)				
SiO ₂ _PhTMS_SO ₃ H-5b	C 1s	284.6 (1.5)	286.3 (1.5)	288.4 (1.5)			
	O 1s	530.7 (1.5)	532.9 (1.5)	534.2 (1.5)	536.3 (1.5)		
	Si 2p	103.5 (1.4)	104.1 (1.4)				
	S 2p	169.2 (1.7)	169.8 (1.7)				
SiO ₂ _CSPTMS-6	C 1s	284.6 (1.3)	286.4 (1.3)	290.4 (1.3)	291.8 (1.3)		
	O 1s	532.6 (1.5)	533.7 (1.5)				
	Si 2p	103.2 (1.7)	103.8 (1.7)				
	S 2p	168.8 (1.3)	170.0 (1.3)				

^{a)} The values between brackets refer to the full width at half-maximum of the bands.