Supplementary information for:

Robust surface coating materials for chemical warfare agent simulant detoxification using ladder-like poly(silsesquioxane) and metal–organic framework composites

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Keywords : Ladder-like Poly(silsesquioxane), Surface coating, Metal-organic Framework (MOF), Polymer Composites, Chemical Warfare Agents (CWA)

Table S1. Detailed amounts for synthesis of LCEISQs with different BPEI fraction.

Entry	Sample	30wt% BPEI in $CHCl_3$ (g)	25wt% LPCPSQ in $CHCl_3$ (g)
1	LCEISQ10	0.13	1.56
2	LCEISQ20	0.24	1.43
3	LCEISQ30	0.33	1.32
4	LCEISQ40	0.40	1.03
5	LCEISQ50	0.50	0.85

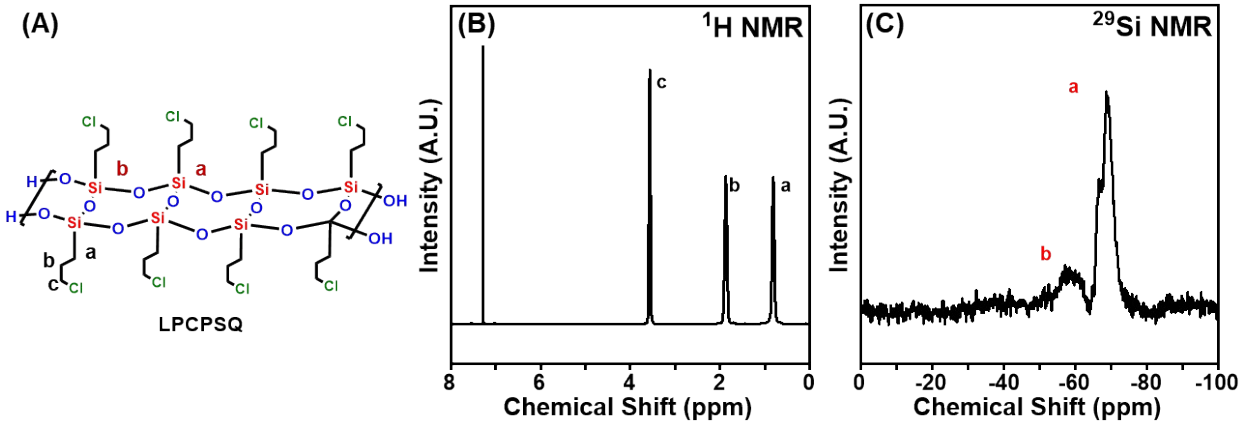

Fig. S1. (A) Chemical structure, (B) ^{1}H NMR spectrum, and (C) ^{29}Si NMR spectrum of synthesized LPCPSQ.

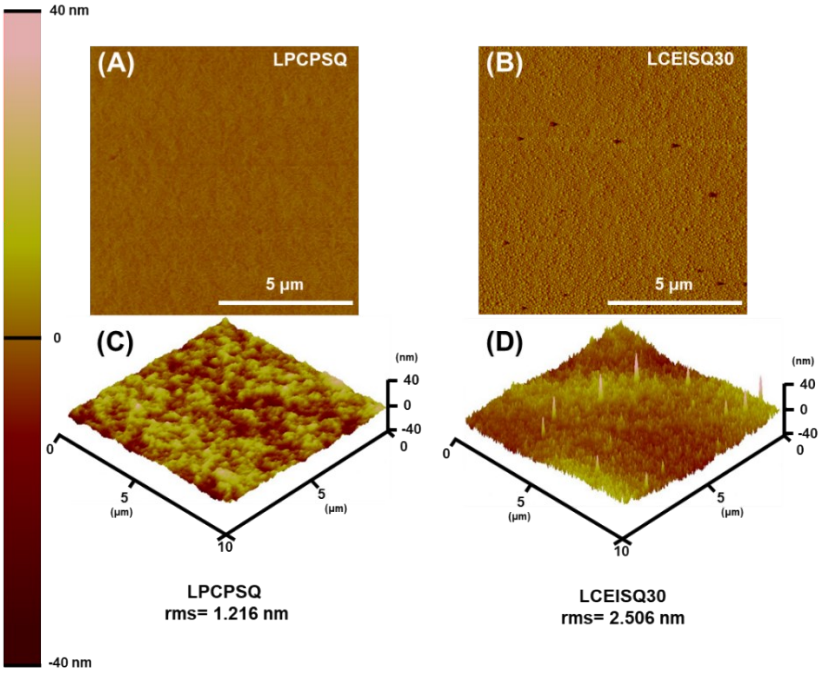

Fig. S2. AFM phase images and 3D topology of the (A, C) LPCPSQ and (B, D) LCEISQ30.

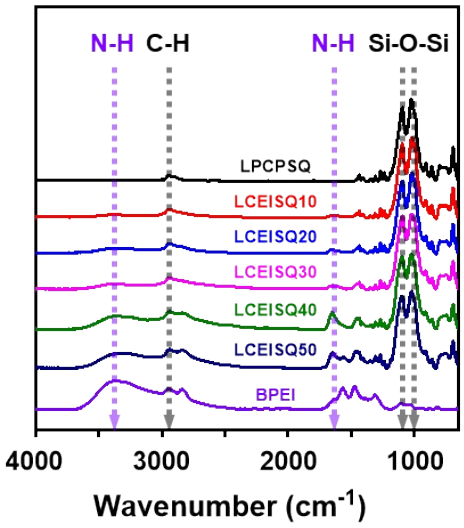

Fig. S3. FT-IR spectra of LCEISQs with varying BPEI contents.

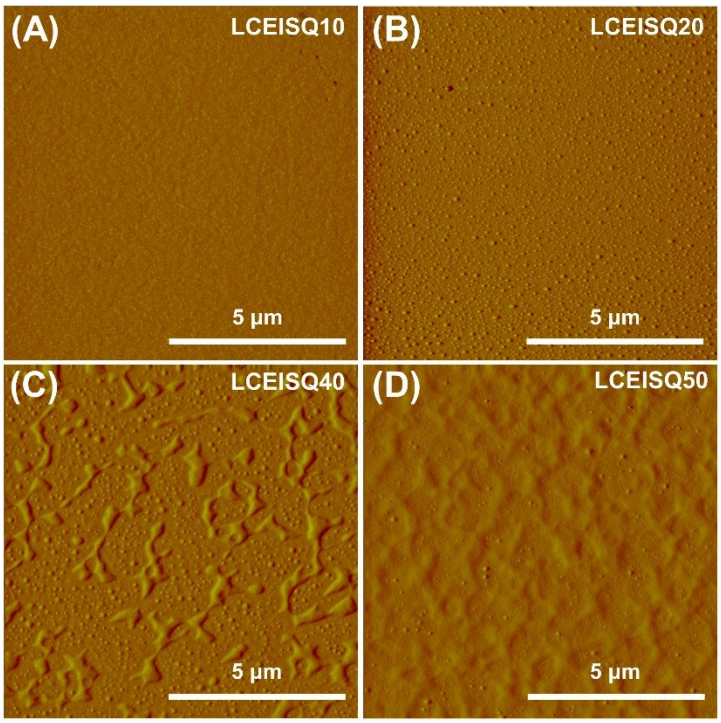

Fig. S4. AFM phase images of LCEISQs with various BPEI fractions (A) LCEISQ10, (B) LCEISQ20, (C) LCEISQ40, and (D) LCEISQ50.

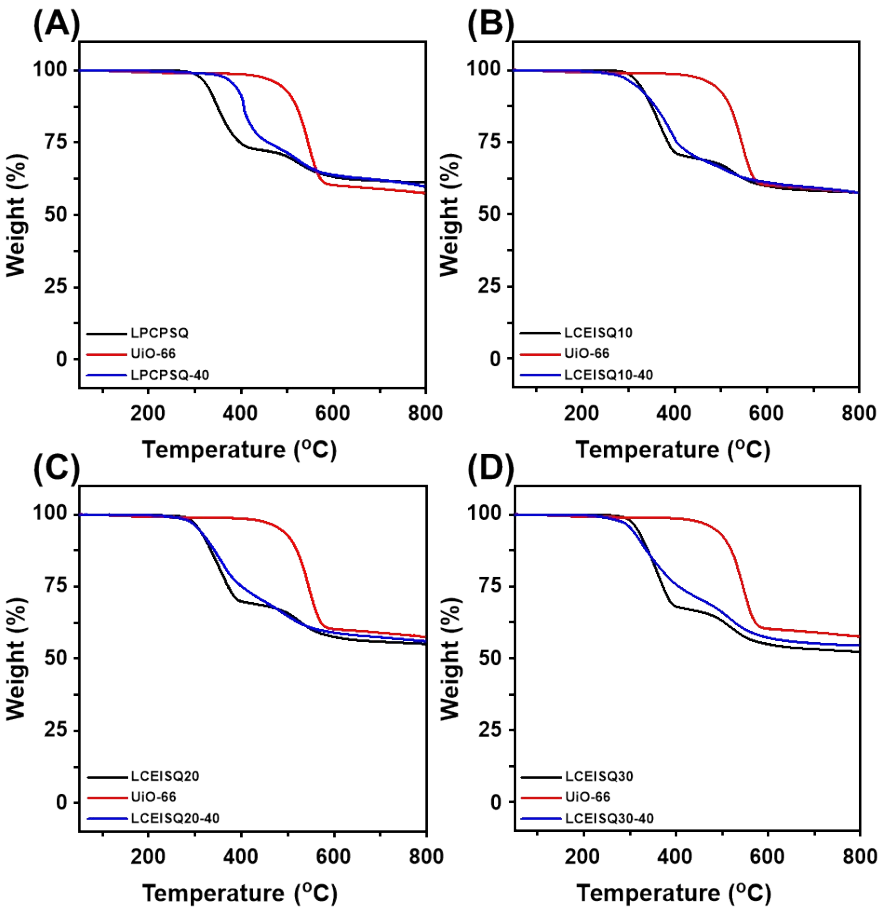

Fig. S5. TGA spectra of LCEISQ & UiO-66 composites, UiO-66, and LCEISQ with various composition (A) LPCPSQ-40, (B) LCEISQ10-40, (C) LCEISQ20-40, and (D) LCEISQ30-40.

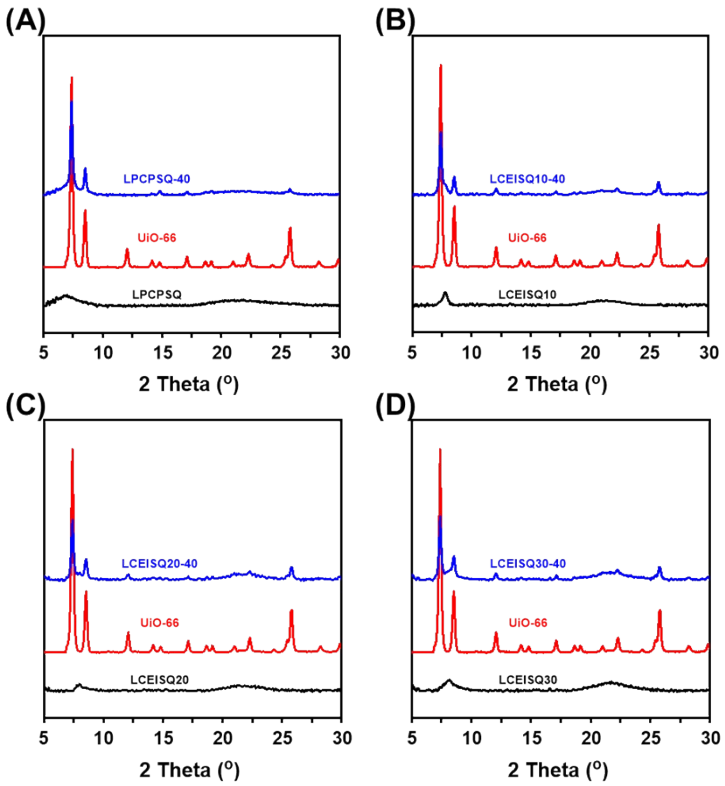

Fig. S6. XRD spectra of LCEISQ & UiO-66 composites, UiO-66, and LCEISQ (A) LPCPSQ-40, (B) LCEISQ10-40, (C) LCEISQ20-40, and (D) LCEISQ30-40.

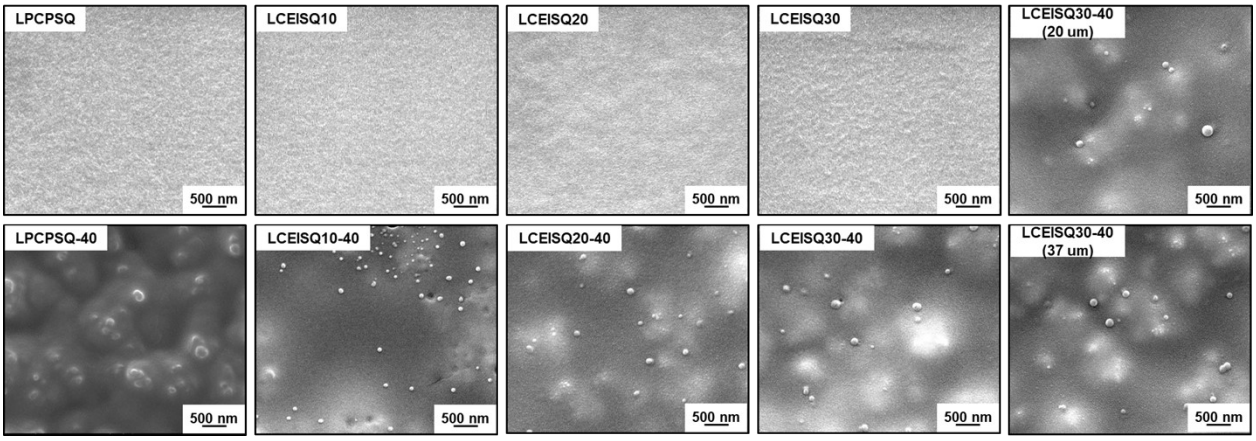

Fig. S7. SEM images of LPCPSQ, LCEISQs, and UiO-66 introduced composite films.

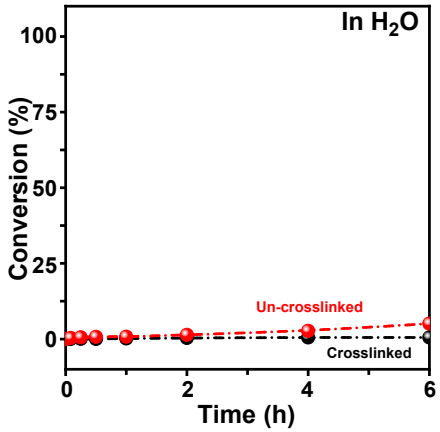

Fig. S8. MPO hydrolysis kinetics in a neutral solution of crosslinked and un-crosslinked LCEISQs.

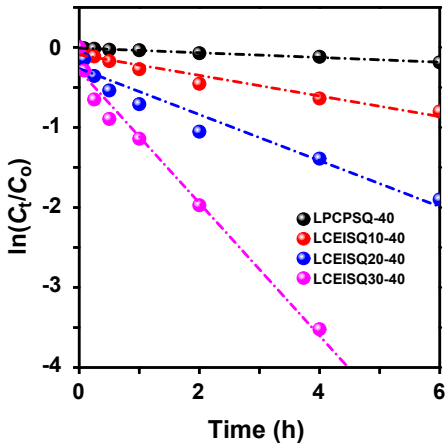

Fig. S9. MPO hydrolysis kinetics in a neutral solution ($\ln(C_t/C_o)$ vs. time plots) of UiO-66 introduced LCEISQs.

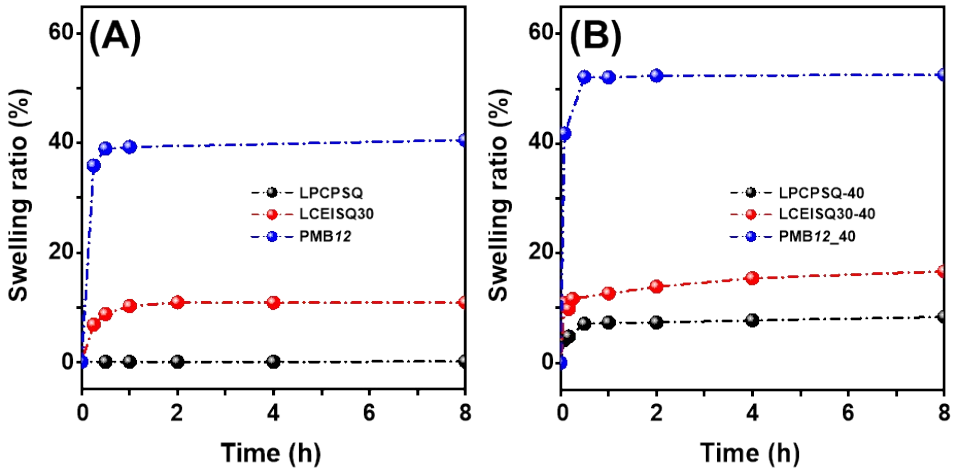

Fig. S10. Swelling test of (A) PMB12, LCEISQs, (B) UiO-66 introduced the composite film with PMB12, LCEISQs under aqueous solution.

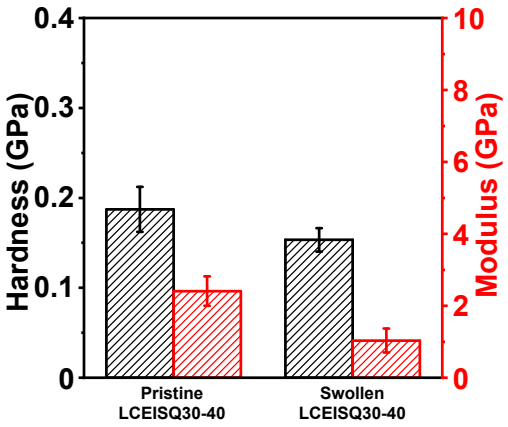

Fig. S11. Mechanical strengths (surface hardness and modulus) of pristine and swollen LCEISQ30-40.

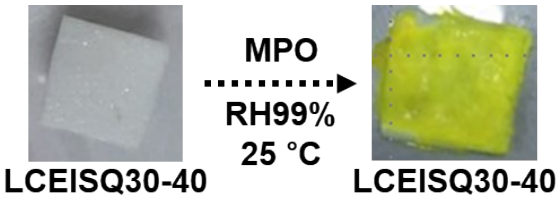

Fig. S12. Digital images of LCEISQ30-40 before and after MPO degradation under relative humidity conditions.

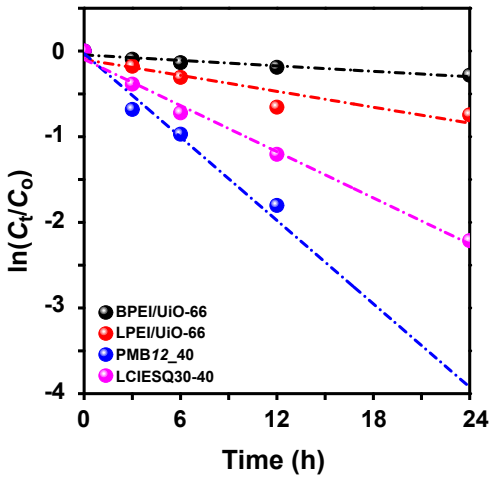

Fig. S13. MPO hydrolysis kinetics in the gas phase ($\ln(C_t/C_o)$ vs. time plot) of UiO-66 introduced LCEISQs

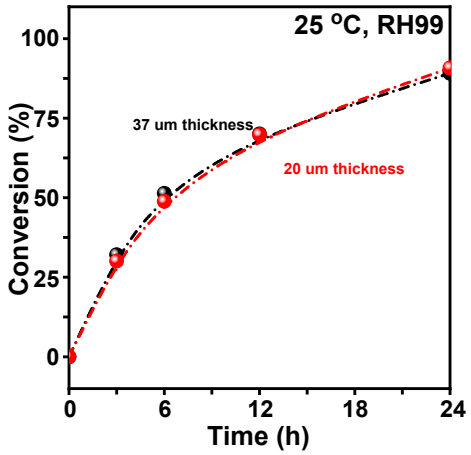

Fig. S14. MPO hydrolysis kinetics in the gas phase of LCEISQ30-40 with 20 and 37 μm thickness (same weight).