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Supporting Information

for

Crosslinking of low density polyethylene with octavinyl polyhedral oligomeric silsesquioxane as the crosslinker

Jiachun Wu, Zi Liang Wu,* Hongmei Yang* and Qiang Zheng

Key Laboratory of Macromolecular Synthesis and Functionalization of Ministry of Education, Zhejiang University, Hangzhou 310027, China; Department of Polymer Science and Engineering, Zhejiang University, Hangzhou 310027, China.

*Corresponding author, e-mail:

wuziliang@zju.edu.cn (Z. L. W.), yanghongmei@zju.edu.cn (H. M. Y.)

Table S1 Processing conditions of melt blending LDPE/OVPOSS/DCP composite in twin-screw extruder.

Barrel zone temperature (°C)				Die zone temperature (°C)	Screw speed (rpm)
I	II	III	IV		
110	125	135	135	135	40

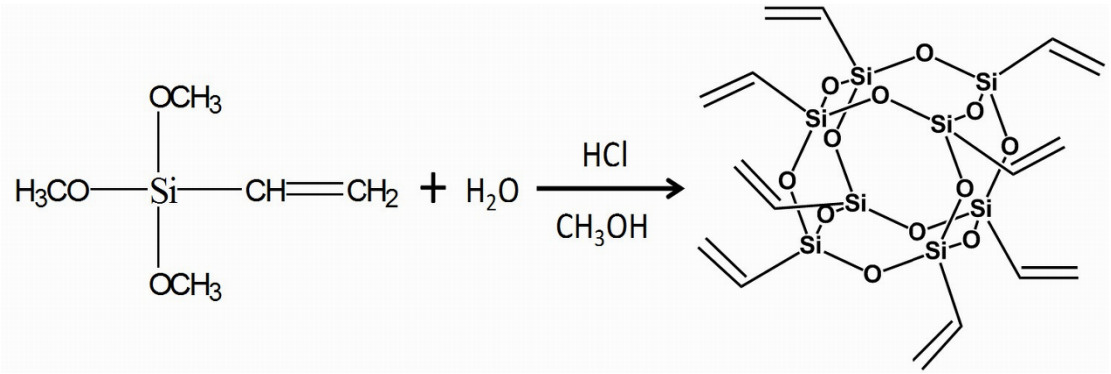
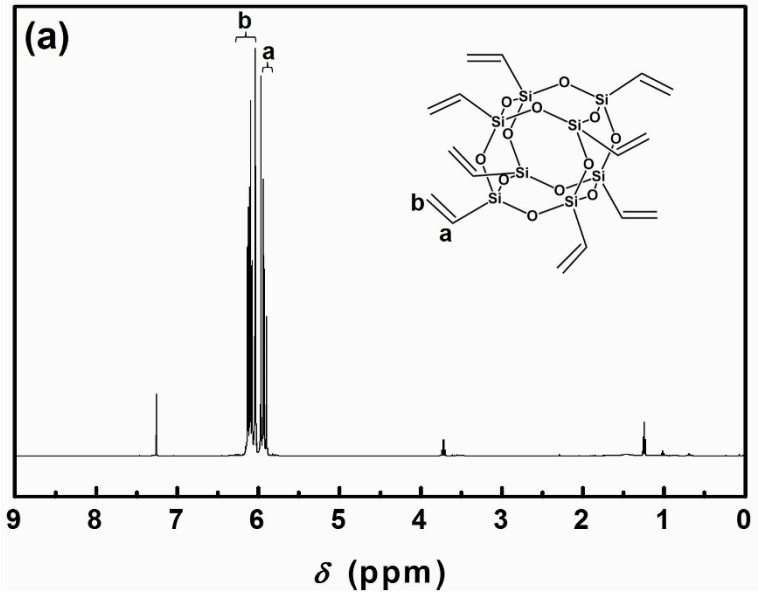


Figure S1 Synthesis of octavinyl polyhedral oligomeric silsesquioxane (OVPOSS).



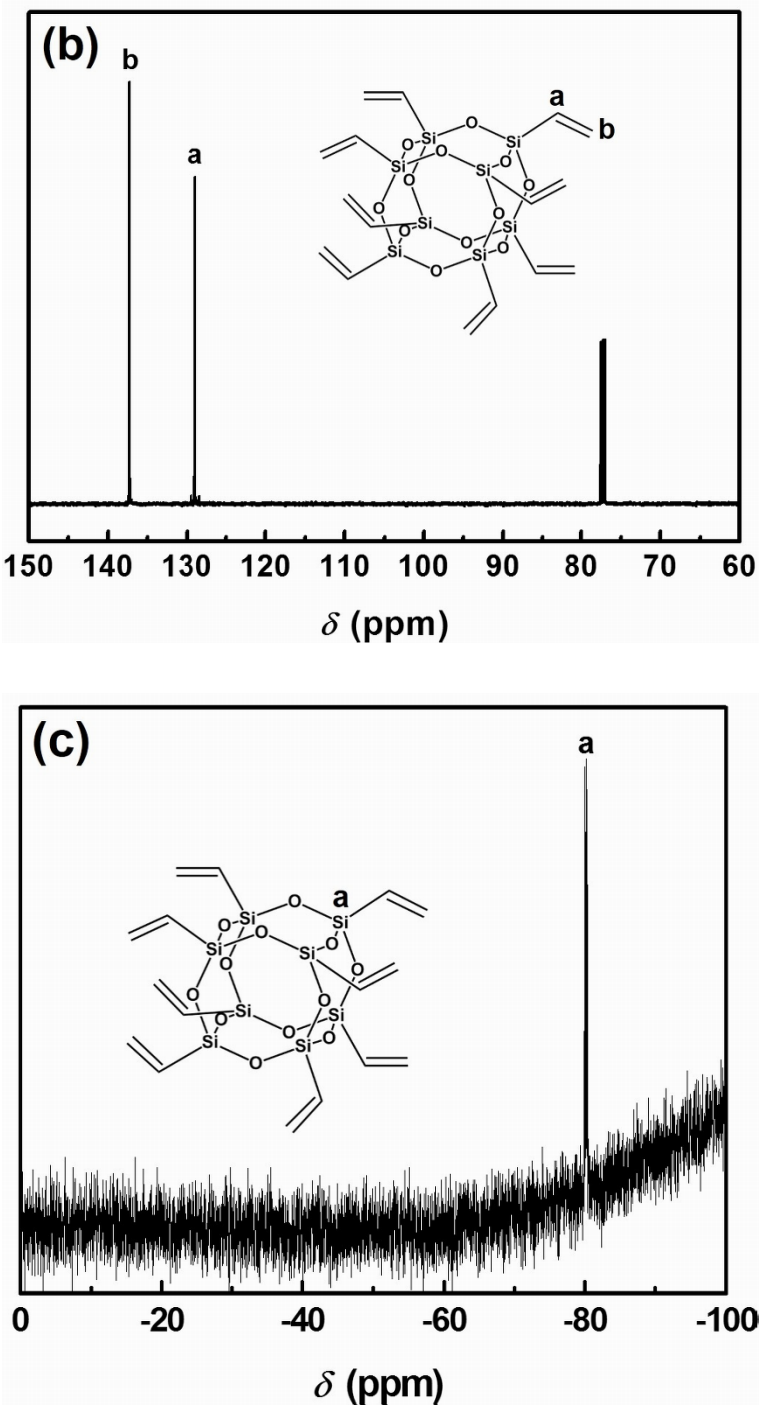


Figure S2 ^{1}H-NMR (a), ^{13}C-NMR (b), and ^{29}Si-NMR (c) spectra of synthesized OVPOSS. The solvent is CCl_3D.

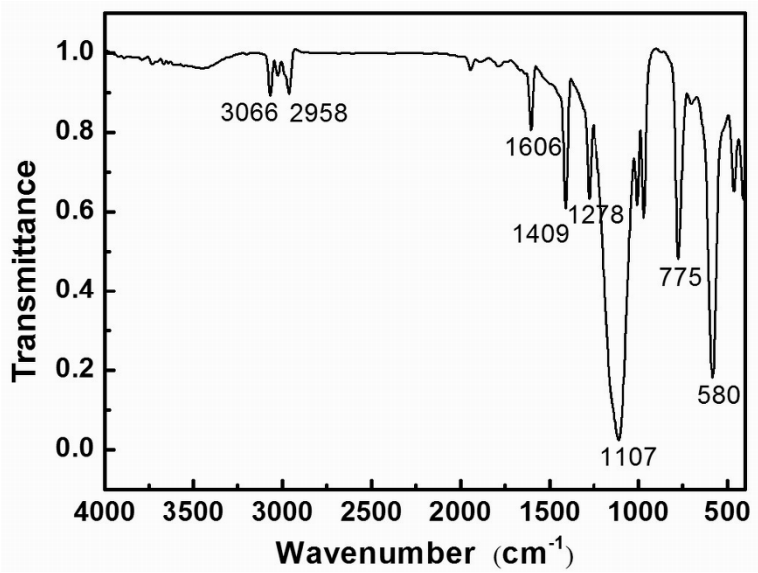


Figure S3 FTIR spectrum of synthesized OVPOSS. $\upsilon_{C\text{-}H(1)}$ = 3066, $\upsilon_{C\text{-}H(2)}$ = 2958, $\upsilon_{C=C}$ = 1606, $\delta_{C\text{-}H(1)}$ = 1409, $\delta_{C\text{-}H(2)}$ = 1278, $\upsilon_{Si\text{-}O\text{-}Si(1)}$ = 1107, $\upsilon_{Si\text{-}O\text{-}Si(2)}$ = 580, $\upsilon_{Si\text{-}C=C}$ = 775 cm^{-1}.

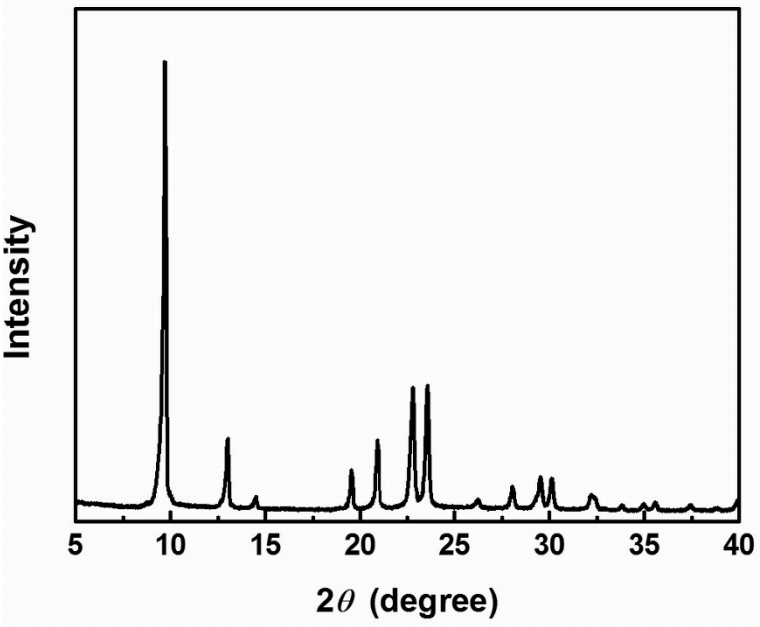


Figure S4 X-ray diffraction spectrum of synthesized OVPOSS. There are three distinct diffraction peaks at 2θ = 9.7°, 22.8°, 23.6° by OVPOSS, corresponding to d-spacing of 9.1, 3.8, and 3.7 Å, respectively.

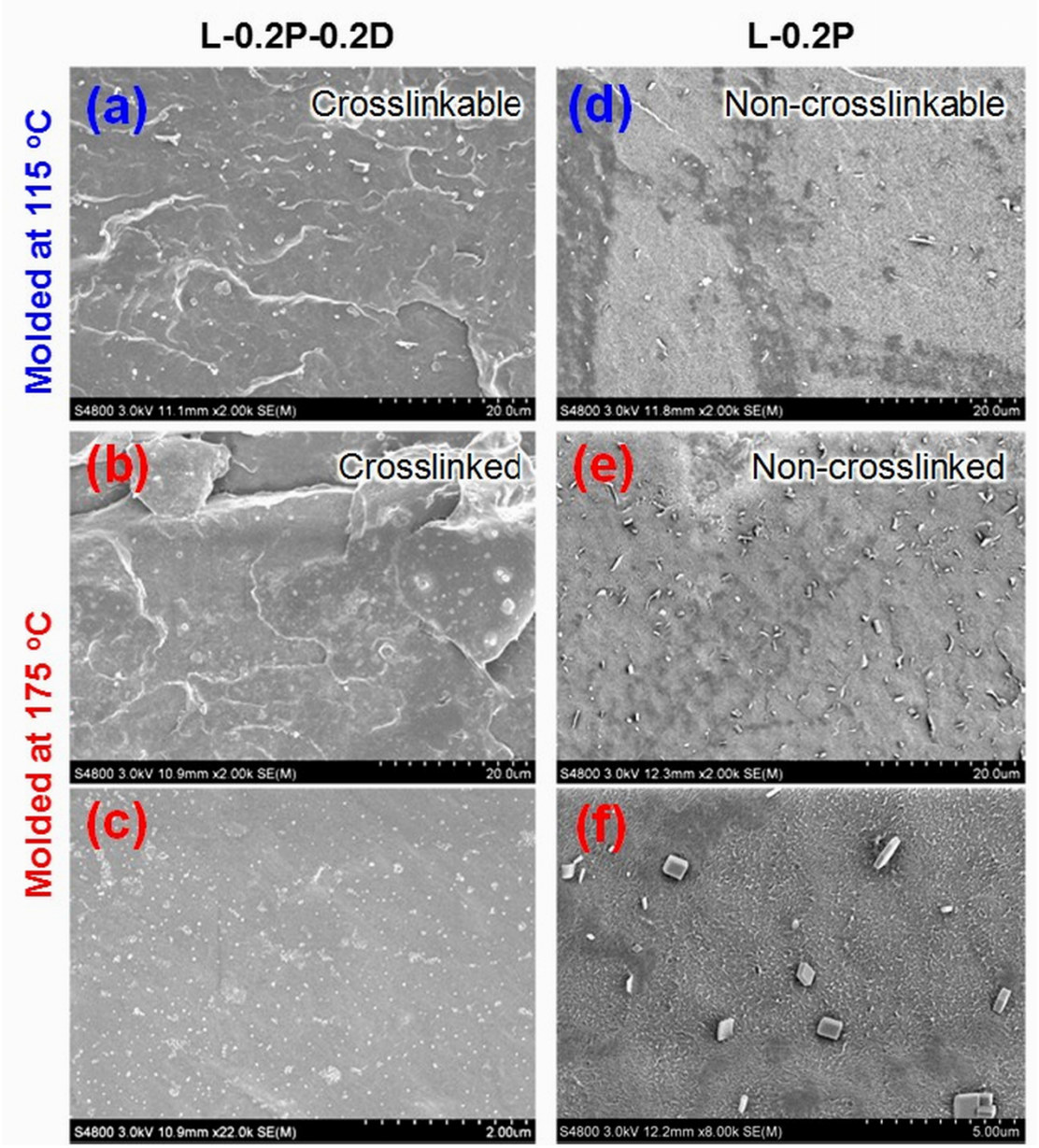


Figure S5 SEM images of the fracture surface of L-0.2P-0.2D (a, b, c) and L-0.2P (d, e, f) molded at 115 °C (a, d) or at 175 °C (b, c, e, f). For L-0.2P-0.2D, crosslinking reaction took place in the presence of DCP, when the sample was molded at 175 °C. For L-0.2P, no reactions occurred when the sample was molded at 175 °C, due to the absence of DCP as the initiator.

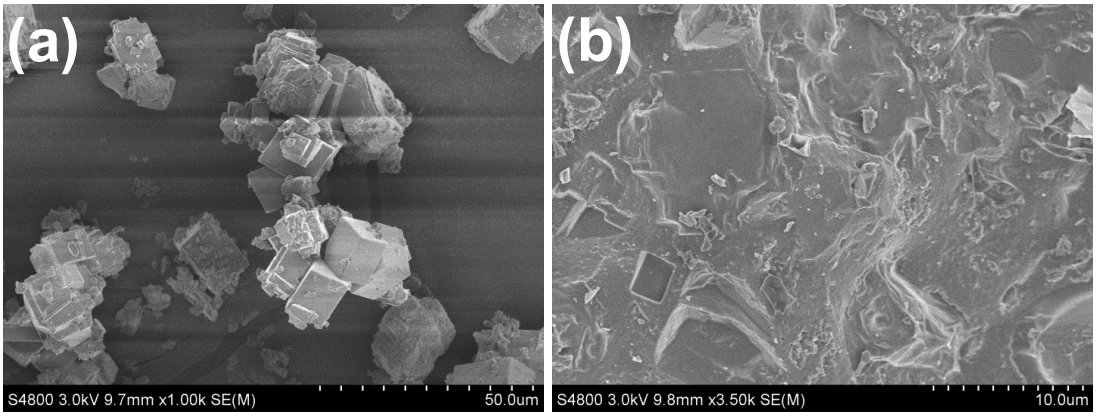


Figure S6 SEM images of the morphology of the mixture of OVPOSS and DCP before (a) and (b) after the reaction in the aluminum capsules by heating it from 40 to 220 ^{o}C in DSC. Mass ratio of OVPOSS and DCP is 10:1; heating rate of DSC is 10 ^{o}C/min.

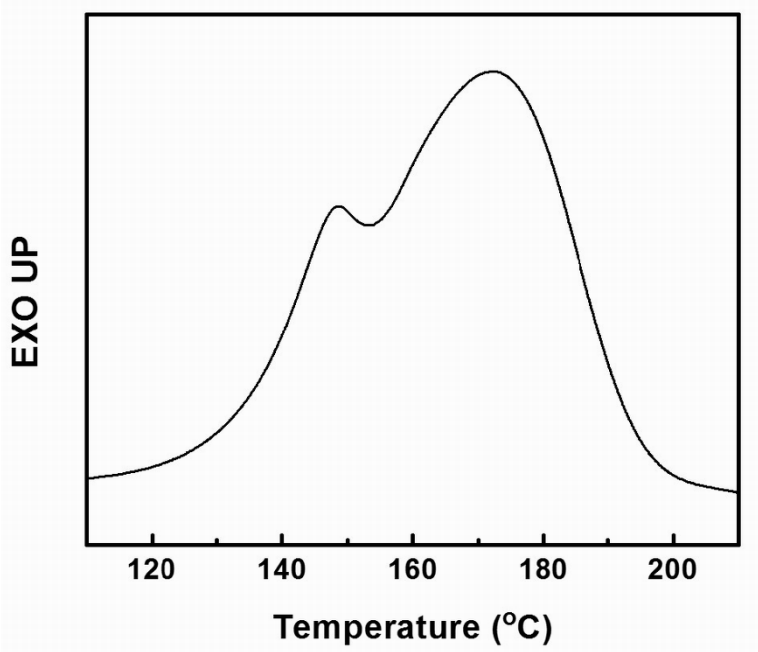


Figure S7 DSC therogram of OVPOSS-DCP (25 wt% DCP content) during the first heating process.

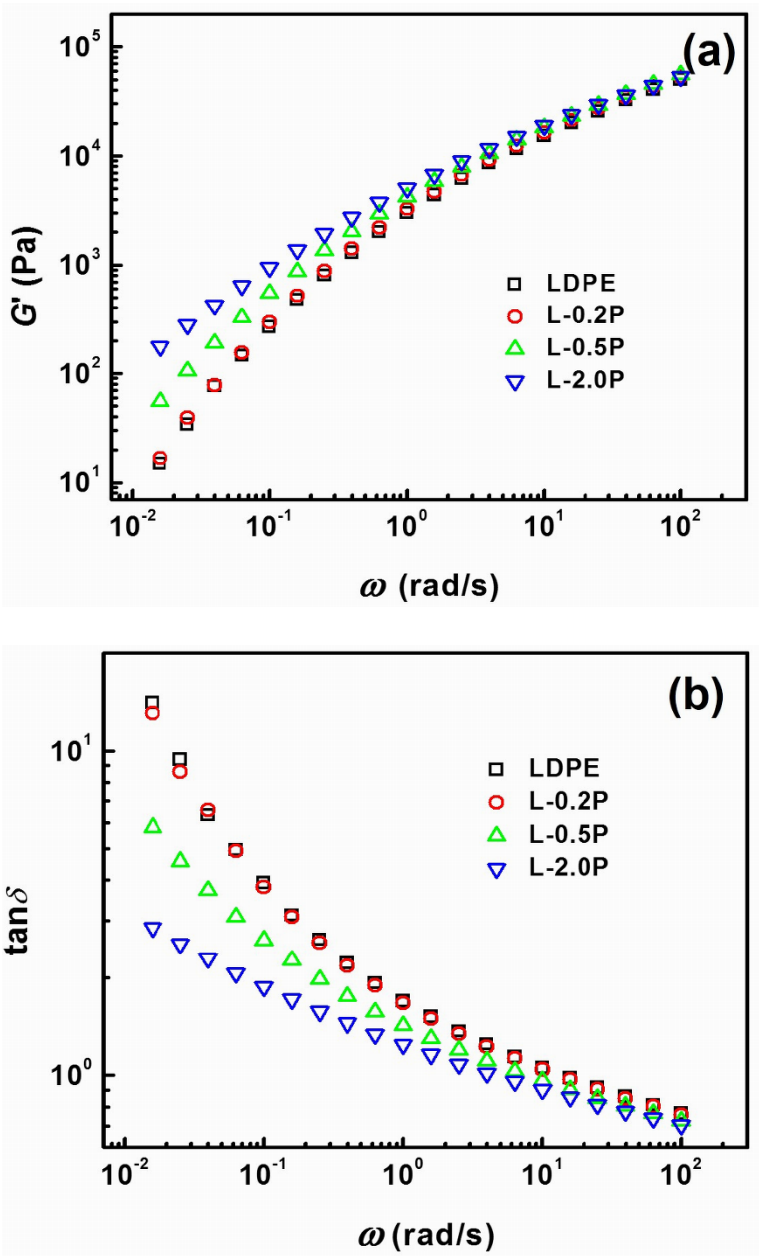


Figure S8 G' (a) and tanδ (b) as a function of ω for samples of L-xD at 150 °C.