Supporting information



TGA degradation

Figure S1:

a) Degradation plots for the 3 formulations. The TPE disintegrates completely below 700°C. HCR material has the same residue with or without crosslinking, which indicates that the silica is methylmodified (not shown). The high residue for LSR is typical of a platinum-filled formulation.

b) Degradation plots for parts A and B of the LSR formulation. Part A contains both platinum and vinyl-modified silica, hence the important residue due to ceramization (66%) at 900°C. Part B does not contain platinum, so the residue is mostly reminiscent of the pure silica introduced in the formulation.



DMA Frequency sweeps

Figure S2: Behavior in tensile DMA at constant temperature and increasing frequencies, at high strains: Samples are pre-strained until =100%, follows a 4 hour wait, then the sinusoidal solicitation is = 1% with a 15% strain offset.

Storage Modulus dependency versus temperature



Figure S3: Illustration of the Arrhenius-like relationship between storage modulus and temperature above the glass-rubber transition of HCR and LSR. The slope of the linear relation between log(E') and the inverse temperature between -50 and 25°C gives an estimate of the filler-network interaction energy. Data points at larger temperatures indicate that with increasing temperature, the temperature behavior of the whole filled elastomer is more and more determined by the entropic elastic behavior of the polymer network.⁹⁴

Fire resistance

The 3 materials were tested through the standard UL-94. TPE is classified under the label V-2, which means the burning stops after 30 seconds on a vertical specimen, with the presence of inflamed drips. In that case the whole material is consumed; flames are spreading quickly completely melting down the sample. For HCR, the sample also burns completely but in a slower fashion and does not melt, but ceramize instead, residual material being damaged silica. It makes it a class V-1 just above TPE. In the case of LSR flame is extinguished almost as soon as the burner is removed, and the material does not spread flames whatsoever, but turns into a brittle brick of silica. It is due to the presence of platinum in the formulation, which is an excellent flame retardant. It makes it a 5VA class material, the top tier one of this standard.