An azide-containing, trifunctional vinyl cross-linker for silicone networks has been synthesized. The cross-linker has through Cu(i) catalyzed 1,3-cycloaddition been reacted with six different alkyne-containing chemical groups which each possess a particular functionality. The functional cross-linkers have been utilized to prepare novel polydimethylsiloxane (PDMS) networks. All functional cross-linkers were successfully incorporated into the networks and were demonstrated to be well distributed within the PDMS films. This was substantiated by fluorescence microscopy of a film prepared with the 4-methyl-umbelliferone containing cross-linker. TGA showed that a ferrocene functionality increased the thermal degradation temperature of PDMS. It was furthermore shown that the incorporation of only 0.25 wt% of the push-pull dipole, ethynyl-4-nitrobenzene, increased the dielectric permittivity of PDMS by 35%. The contact angle of PDMS films was increased from 108° to 116° by the introduction of a small poly(pentafluorostyrene) chain. Finally, 17α-ethynyl-1,3,5(10)-estratriene-3,17β-diol and 1-ethynyl-3,5-bis(trifluoromethyl)benzene were incorporated as examples of other functional groups. © 2013 The Royal Society of Chemistry.
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