# Alkene-Azide Chemistry: A Facile, One-Step, Solvent- and Catalyst-Free Approach for Developing New Functional Monomers and Polymers

Santimukul Santra,[a,*] Ren Bean,[a,†] Blaze Heckert,[a,†] Zachary Shaw,[a] Vedant Jain,[a] Lok Shrestha,[a] Raghunath Narayanam[a] and Quentin Austin[a]

[a] *Department of Chemistry, Pittsburg State University, 1701 S Broadway Street, Pittsburg, KS 66762, USA.*

**Corresponding author: Santimukul Santra, Email: ssantra@pittstate.edu*

*†Authors contributed equally.*

*Keywords*: green chemistry, Hüisgen 1,3-dipolar cycloaddition, click-ene chemistry, functional monomers, macromolecules

## **Section 1**: Characterization of functional monomers and polymers

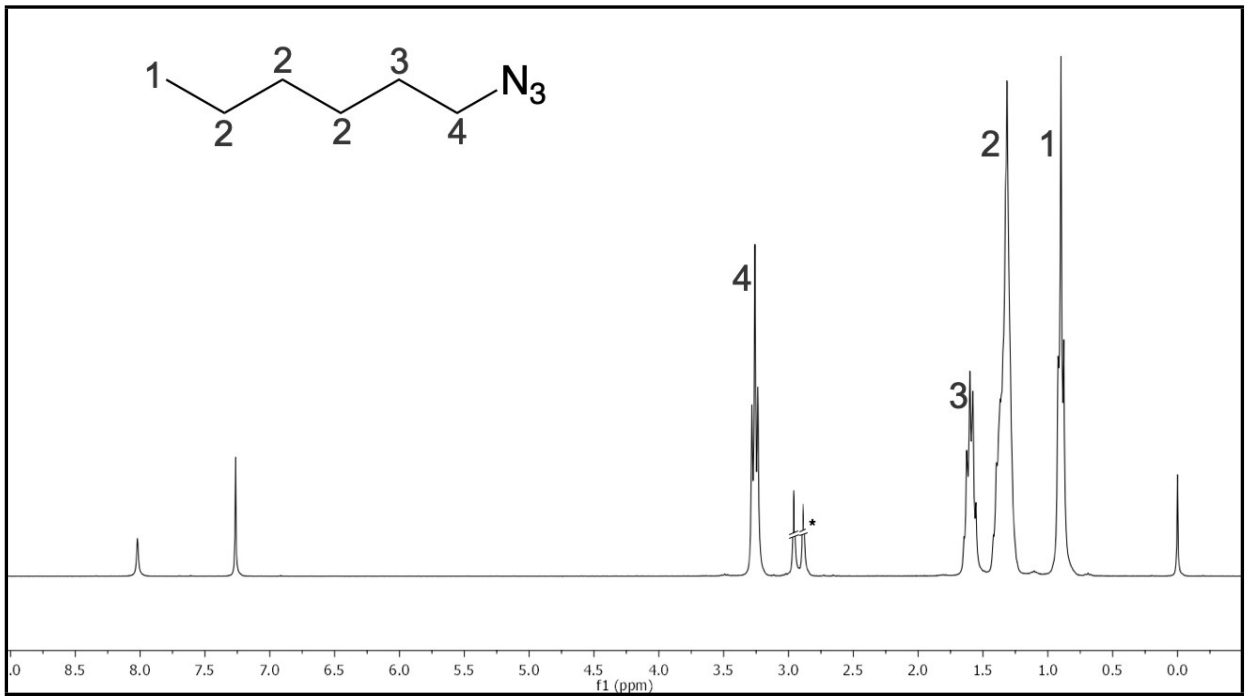


***Figure S1***: $^{1}H$ NMR spectrum of hexyl azide. Residual solvent peaks can be seen from 2.75 – 3.0 ppm and 8.0 ppm. Spectra was obtained in $CDCl_3$ (7.26 ppm). *Residual solvent peaks were reduced to improve clarity of the spectrum.

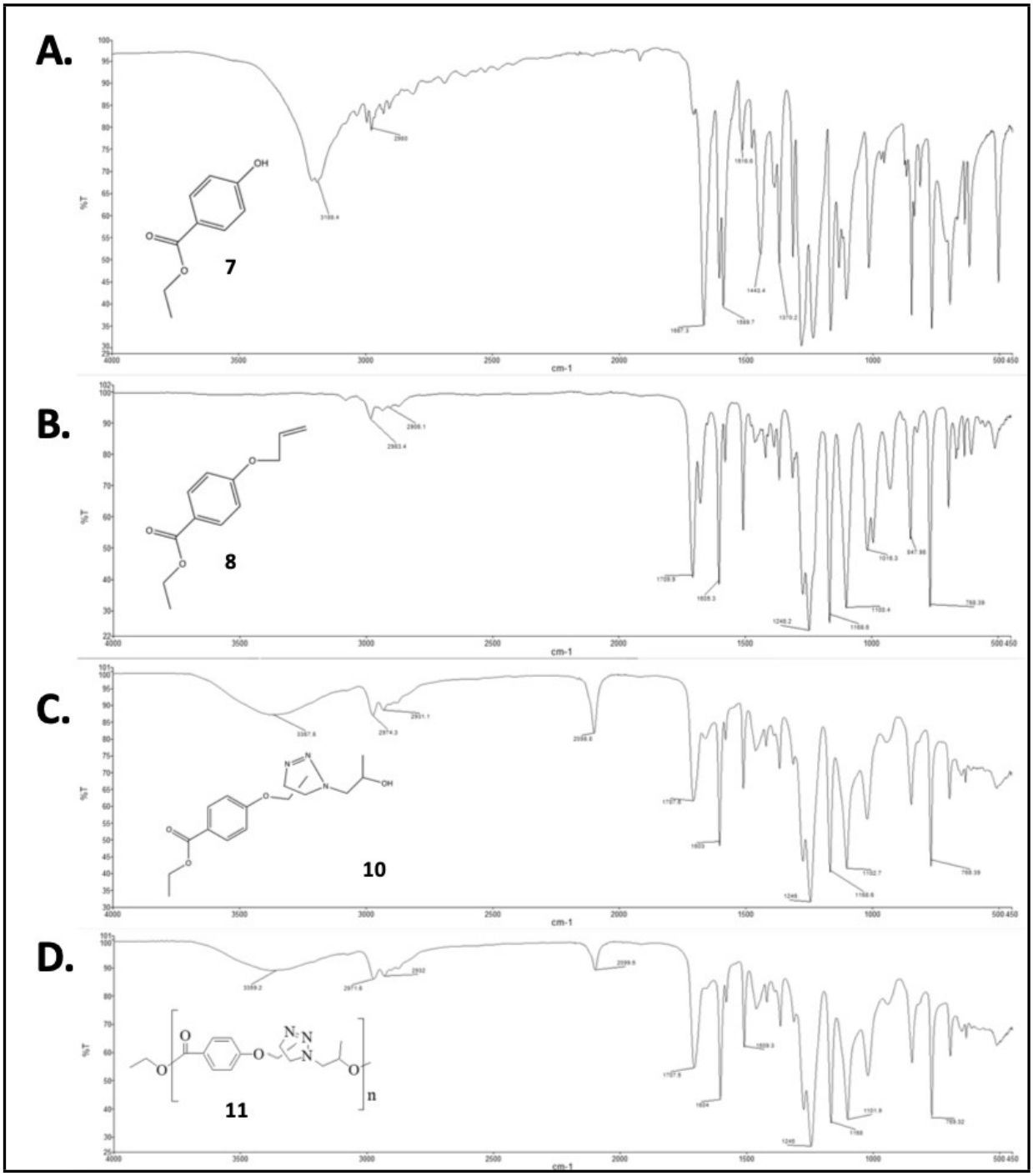


***Figure S2***: FT-IR spectra of **A**) starting material ethyl protected benzoic acid (**7**), **B**) subsequent vinyl functionalized starting material (**8**), **C**) "Click-ene" constructed monomer (**10**), and **D**) resulting polymer (**11**).

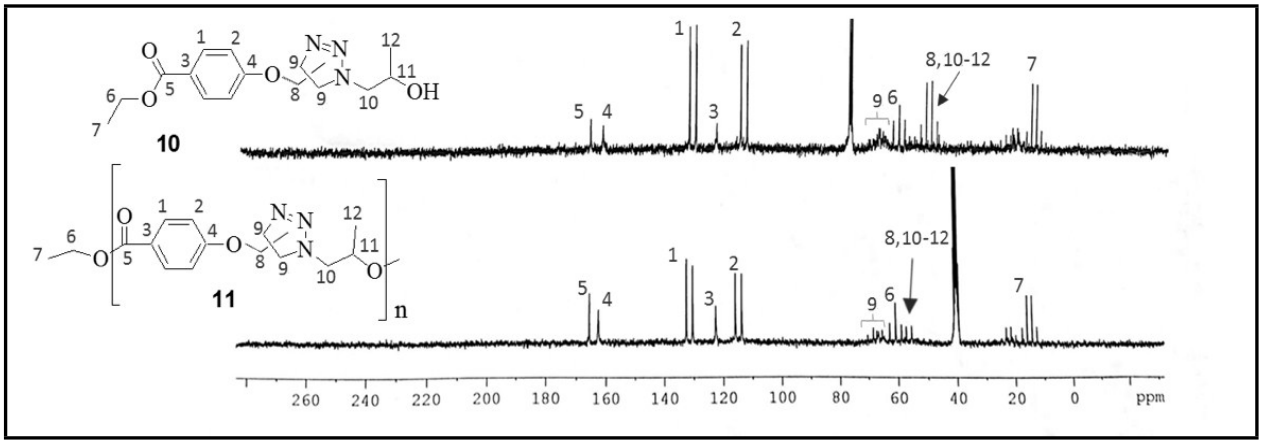


***Figure S3***: $^{13}C$ NMR of ethyl protected benzoic acid (**7**), subsequent vinyl functionalized starting material (**8**), "Click-ene" constructed monomer (**10**), and resulting polyester polymer (**11**). Compound **10** spectra was obtained in $CDCl_3$ (77.16 ppm) and polymer **11** was obtained in DMSO-$d_6$ (39.52 ppm).

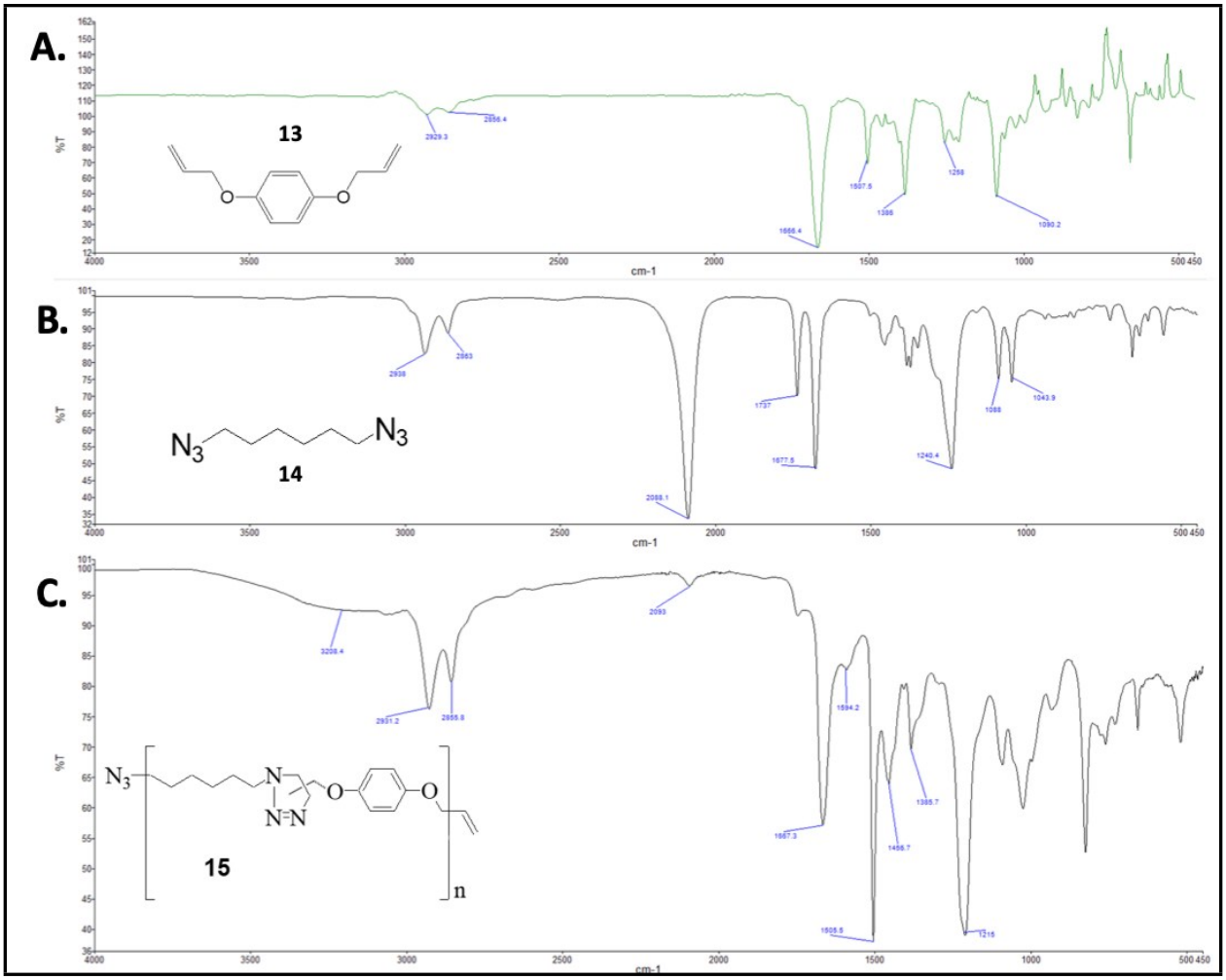


***Figure S4***: FT-IR spectra of **A**) aryl alkene (**13**), **B**) diazide starting material (**14**), and **C**) resulting "Click-ene" aryl polymer (**15**).

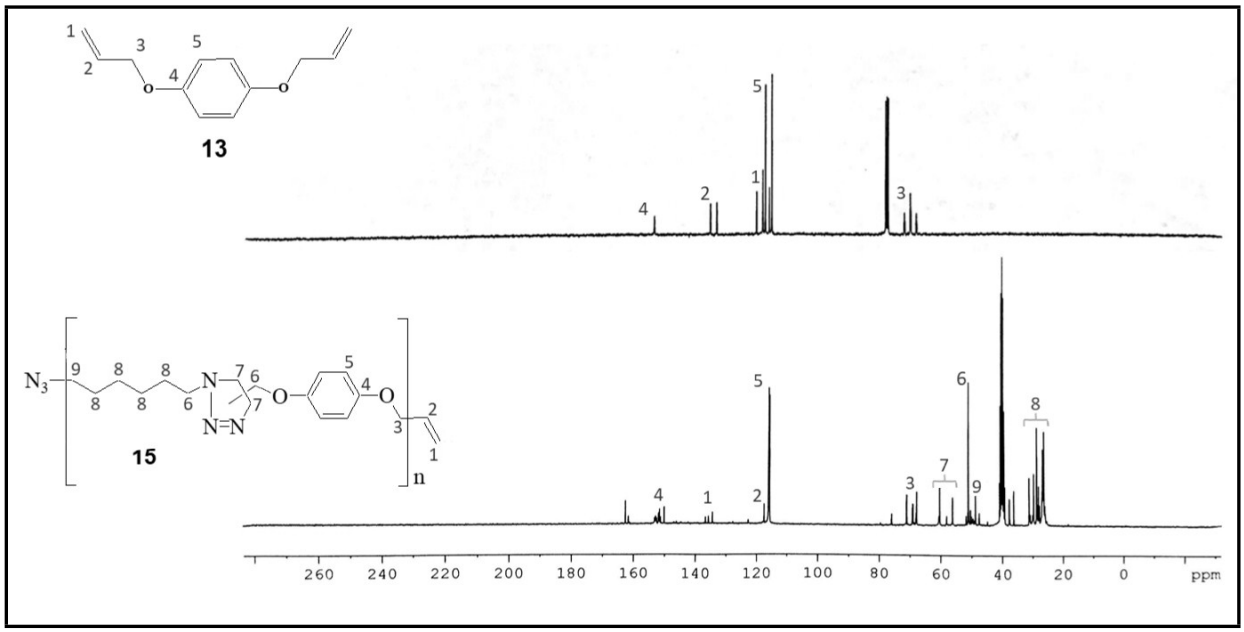


***Figure S5***: $^{13}C$ NMR of the aryl alkene (**13**) and resulting "Click-ene" polymer (**15**). Compound **13** spectra was obtained in $CDCl_3$ (77.16 ppm) and polymer **15** was obtained in DMSO-$d_6$ (39.52 ppm).

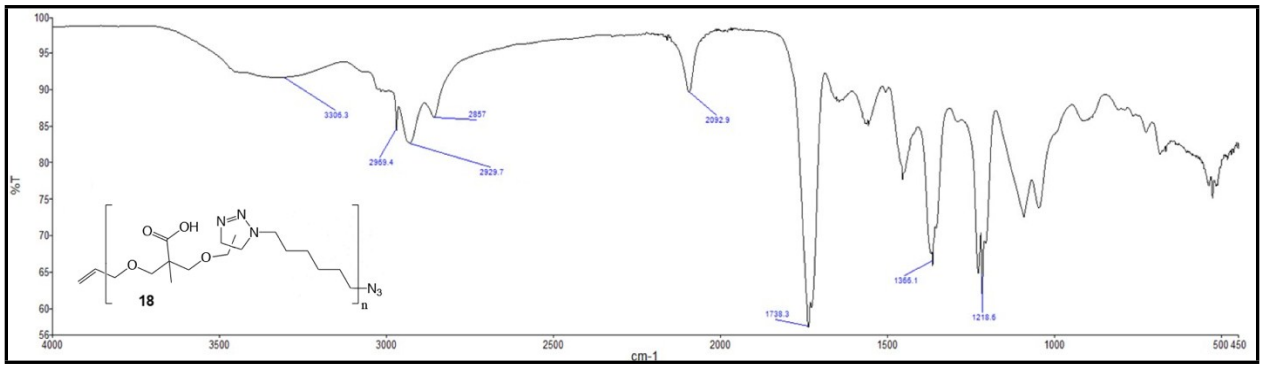


***Figure S6***: FT-IR spectra of the aliphatic "Click-ene" polymer (**18**).

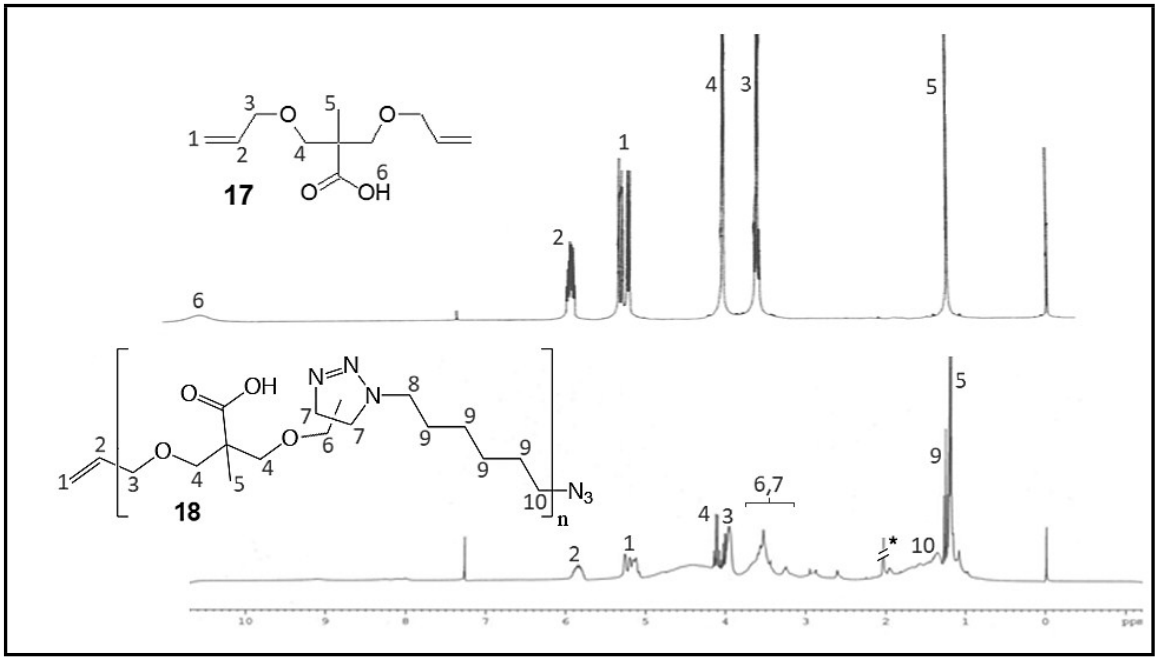


***Figure S7***: $^{1}H$ NMR of the aliphatic alkene (**17**) and resulting "Click-ene" aliphatic polymer (**18**). Both spectra were obtained in $CDCl_3$ (7.26 ppm). A residual solvent peak (acetone) can be seen at 2.1 ppm. *Residual solvent peak was reduced to improve clarity of the spectrum.

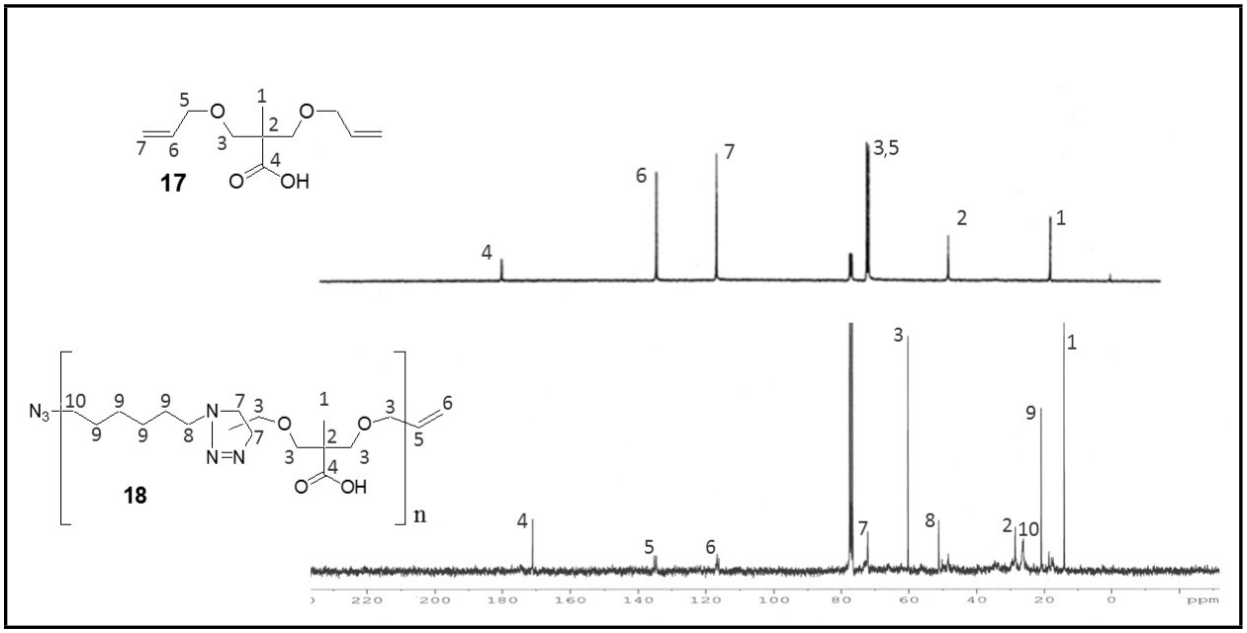


***Figure S8***: $^{13}C$ NMR of the aliphatic alkene (**17**) and resulting "Click-ene" constructed polymer (**18**). Both spectra were obtained in $CDCl_3$ (77.16 ppm).

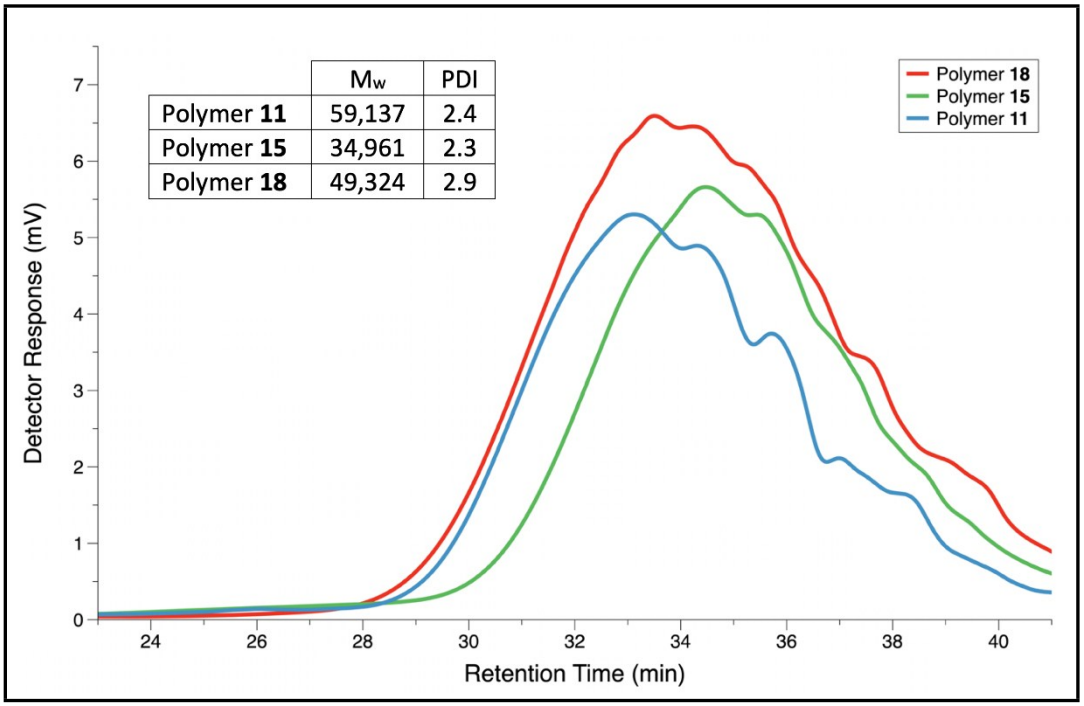


***Figure S9***: SEC of "Click-ene" based polymers and **Table S1** (inset) showing weight average molecular weight ($M_w$) and PDI from SEC.

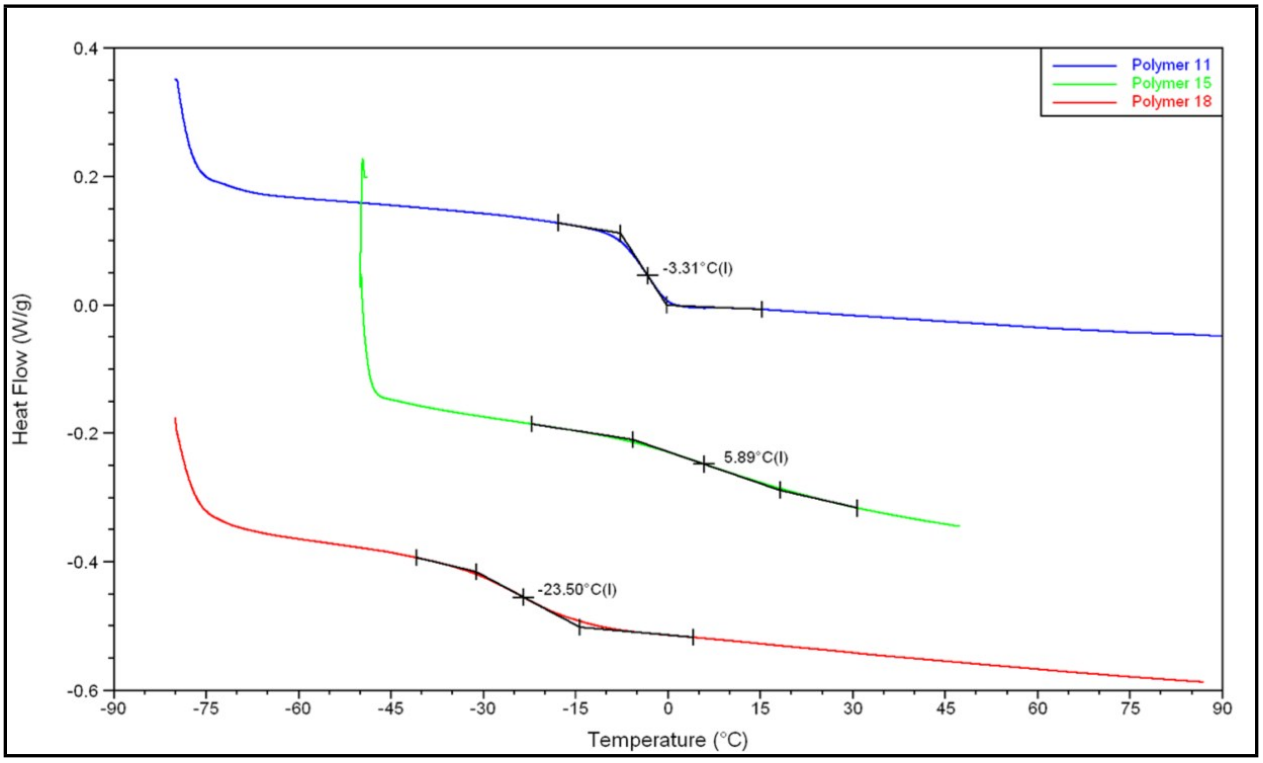


***Figure S10**: DSC of "Click-ene" based polymers.*

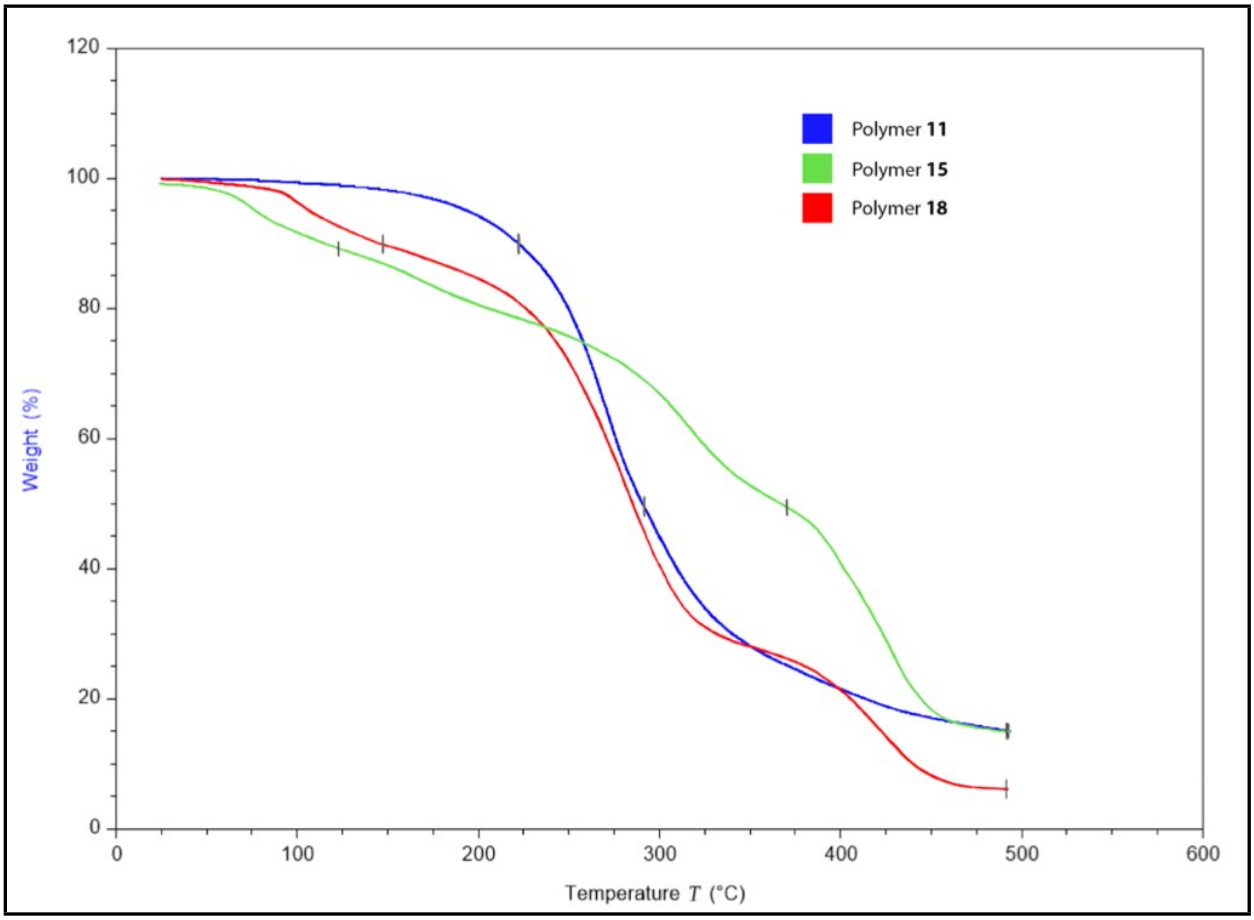


***Figure S11**: TGA of "Click-ene" based polymers.*