

<Supporting Information>

Combining vinylogous urethane and β -amino ester chemistry for dynamic material design

Joshua O. Holloway,[†] Christian Taplan[†] and Filip E. Du Prez^{*}

Polymer Chemistry Research group, Centre of Macromolecular Chemistry (CMaC), Department of Organic and Macromolecular Chemistry, Faculty of Sciences, Ghent University, Krijgslaan 281 S4-bis, 9000, Ghent, Belgium.

Table of Contents

Online FTIR spectra	2
Graphical data attributed to reference networks (A & B)	3
DSC thermograms	3
TGA thermograms	4
Stress relaxation and Arrhenius plots	5
Graphical data attributed to networks (C-K)	6
DSC thermograms of C-K	6
DSC thermograms of I, J and K recycled networks	7
TGA thermograms of C-K	8
TGA thermograms of I, J and K recycled networks	10
Additional soluble fraction data of networks C-K	11
Rheology data	12
Stress relaxation and Arrhenius plots of C-H	12
Arrhenius plots of I, J and K	14
Rheological analysis of recycled networks I, J, and K (R1-R3)	15
Stress relaxation and Arrhenius plots	15

Online FTIR spectra

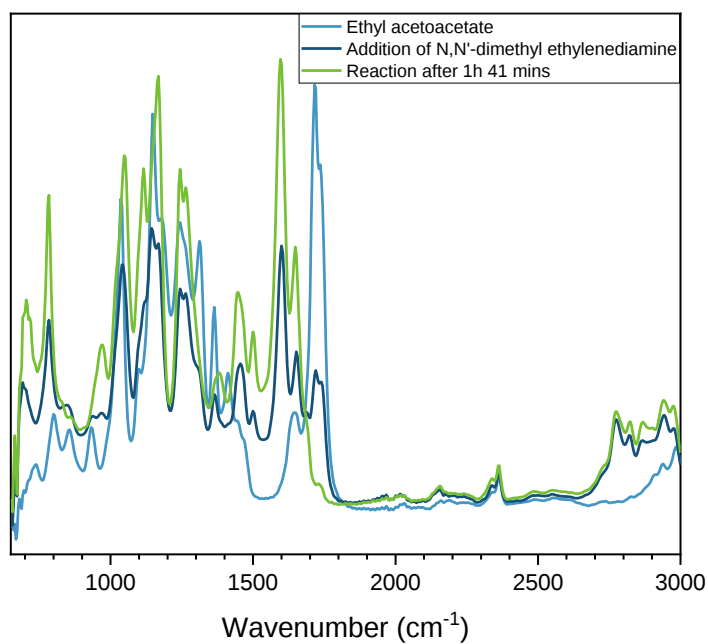


Figure S 1: FTIR spectra of the reaction between ethyl acetoacetate and N,N'-dimethyl ethylenediamine.

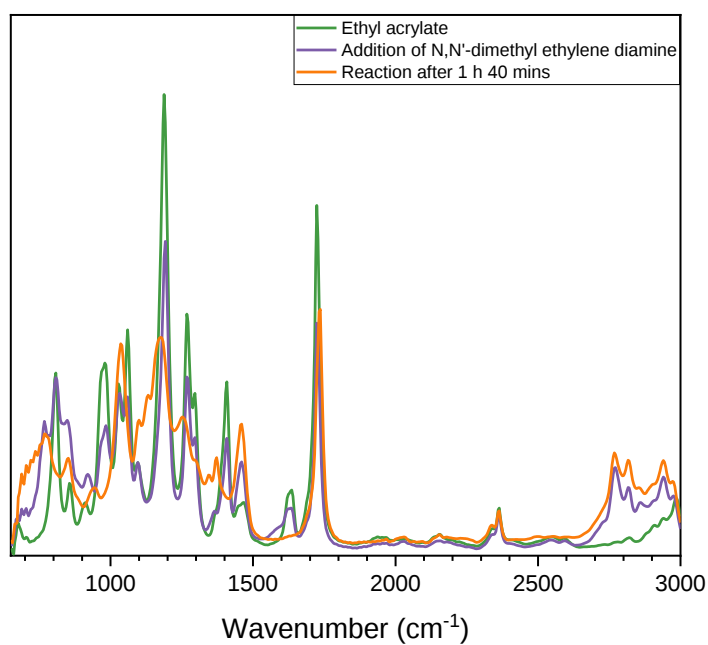


Figure S 2: FTIR spectra of the reaction between ethyl acrylate and N,N'-dimethyl ethylenediamine.

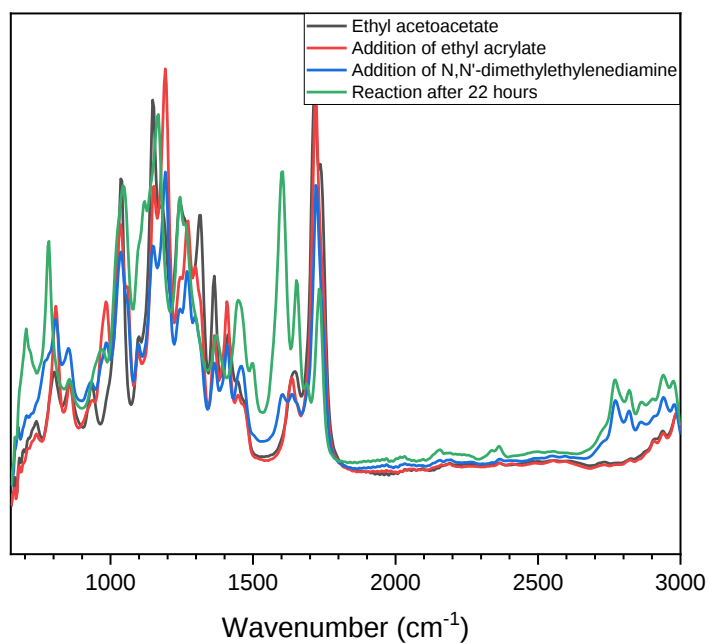


Figure S 3: FTIR spectra of the one-pot reaction between ethyl acrylate, ethyl acetoacetate and N,N'-dimethyl ethylenediamine.

Graphical data attributed to reference networks (A & B)

DSC thermograms

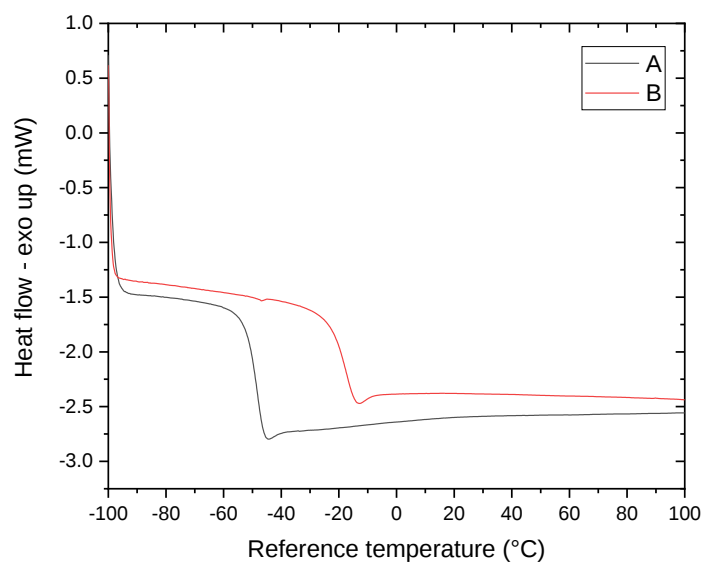


Figure S 4: DSC thermograms of A and B with a heating rate of 10 °C.min⁻¹ from -100 to 100 °C under N₂.

TGA thermograms

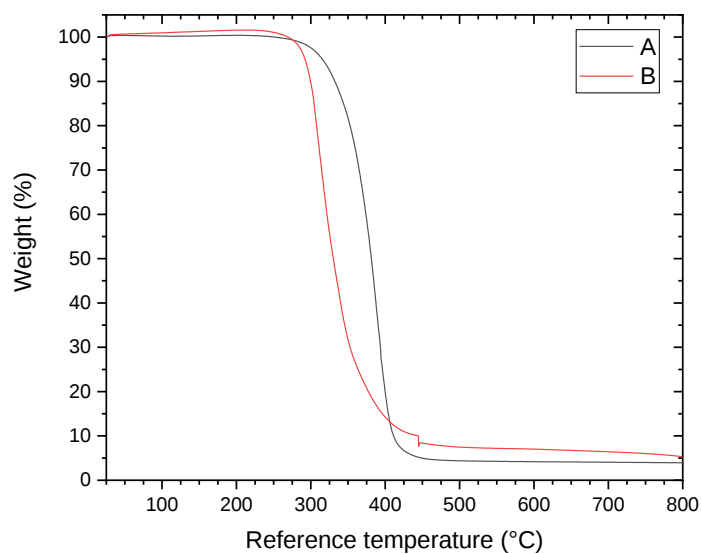


Figure S 5: TGA temperature ramp thermograms of A and B with a heating rate of $10\text{ }^{\circ}\text{C}\cdot\text{min}^{-1}$ from $25\text{ }^{\circ}\text{C}$ to $800\text{ }^{\circ}\text{C}$ under N_2 .

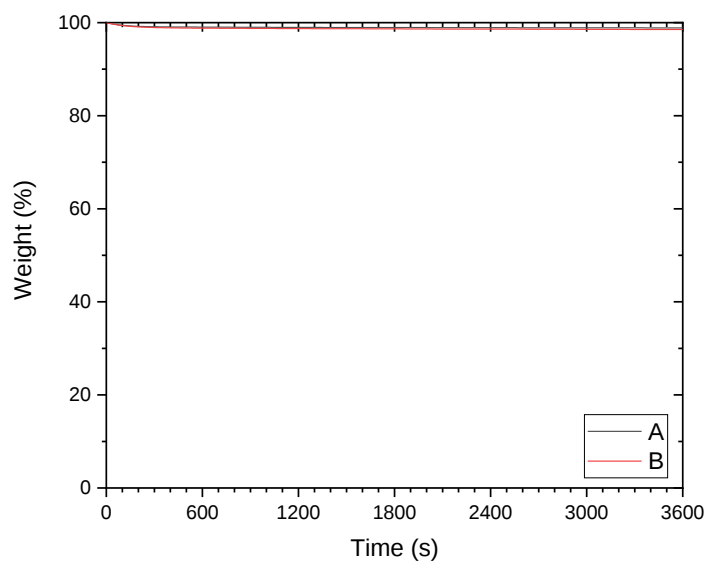


Figure S 6: Isothermal ($150\text{ }^{\circ}\text{C}$) TGA thermograms of A and B under N_2 .

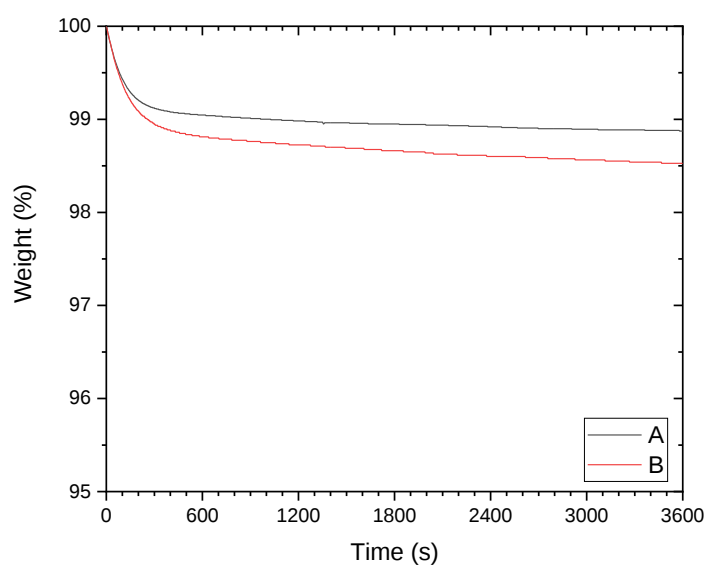


Figure S 7: Zoomed in (95-100 % weight remaining) isothermal (150 °C) TGA thermograms A and B under N_2 .

Stress relaxation and Arrhenius plots

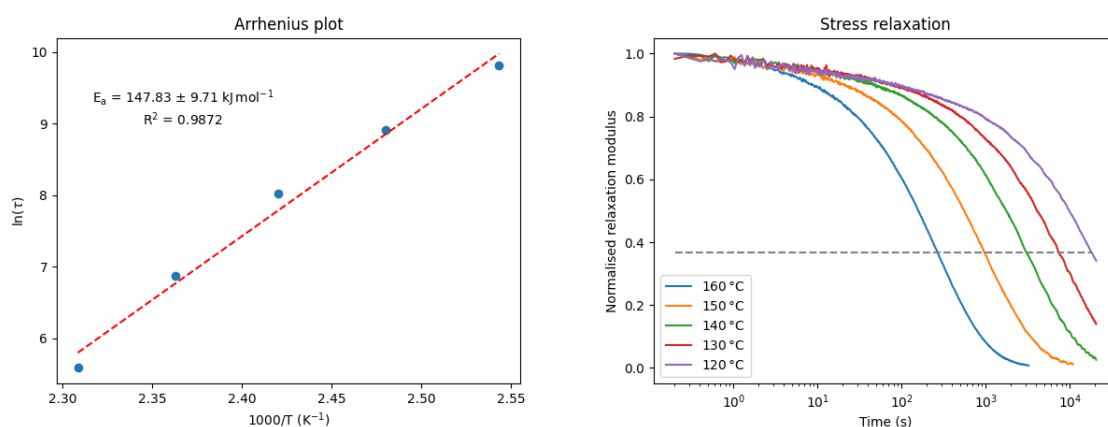


Figure S 8: Left) Arrhenius plot and right) normalised stress relaxation plot of A.

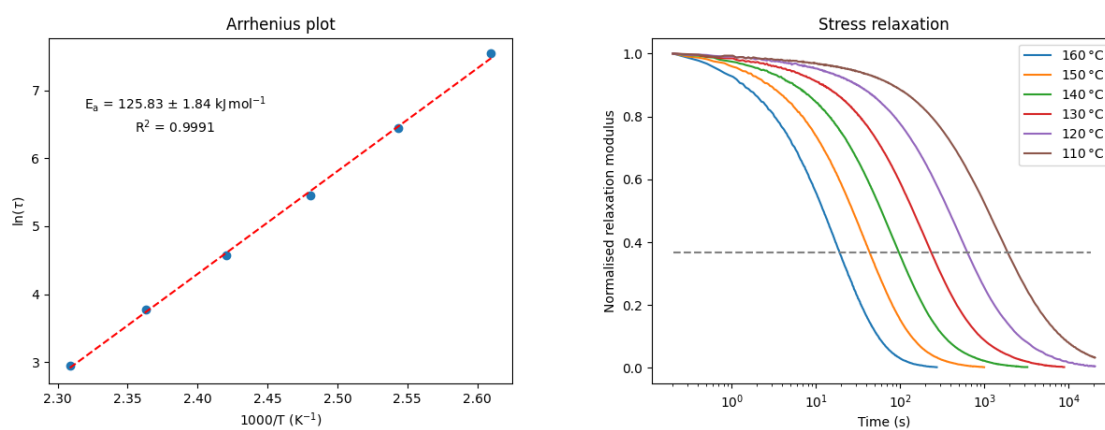


Figure S 9: Left) Arrhenius plot and right) normalised stress relaxation plot of B.

Graphical data attributed to networks (C-K)

DSC thermograms of C-K

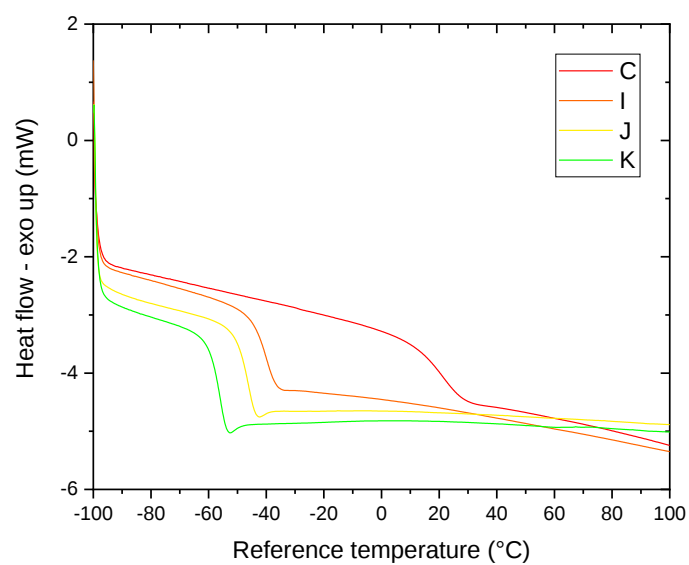


Figure S 10: DSC thermograms of C, I, J and K with a heating rate of $10\text{ }^{\circ}\text{C}\cdot\text{min}^{-1}$ from -100 to 100 °C under N_2 .

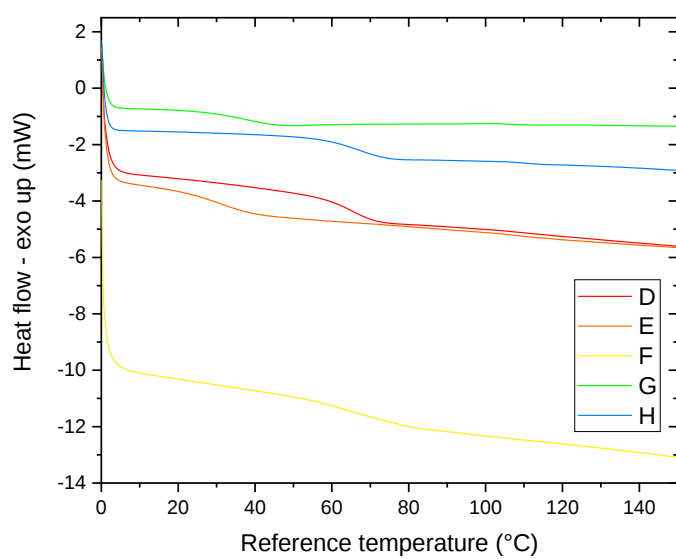


Figure S 11: DSC thermograms of D-H with a heating rate of $10\text{ }^{\circ}\text{C}\cdot\text{min}^{-1}$ from 0 to 150 °C under N_2 .

DSC thermograms of I, J and K recycled networks

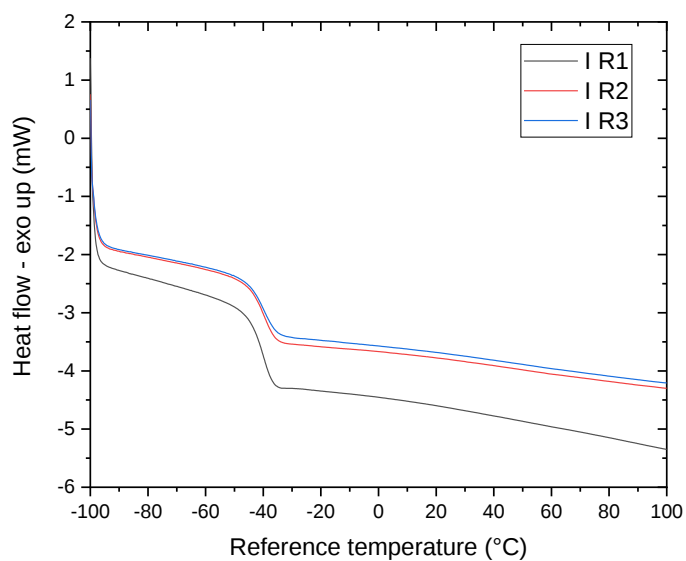


Figure S 12: DSC thermograms of I with a heating rate of $10\text{ }^{\circ}\text{C}.\text{min}^{-1}$ from -100 to $100\text{ }^{\circ}\text{C}$ under N_2 following the first, second and third recycling steps.

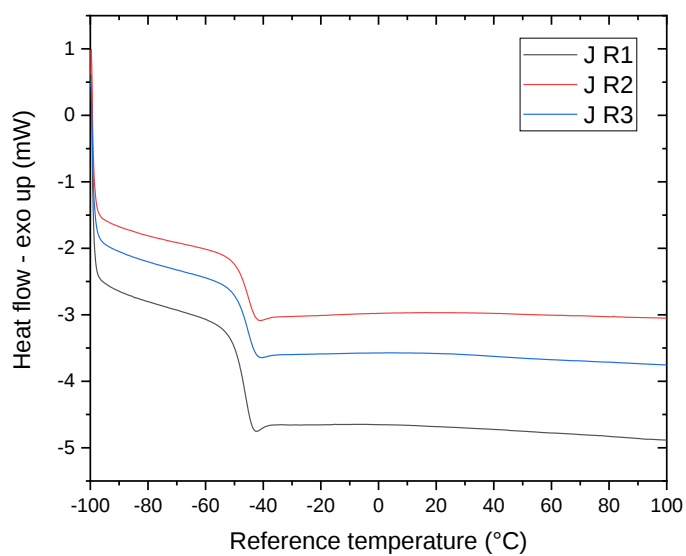


Figure S 13: DSC thermograms of J B with a heating rate of $10\text{ }^{\circ}\text{C}.\text{min}^{-1}$ from -100 to $100\text{ }^{\circ}\text{C}$ under N_2 following the first, second and third recycling steps.

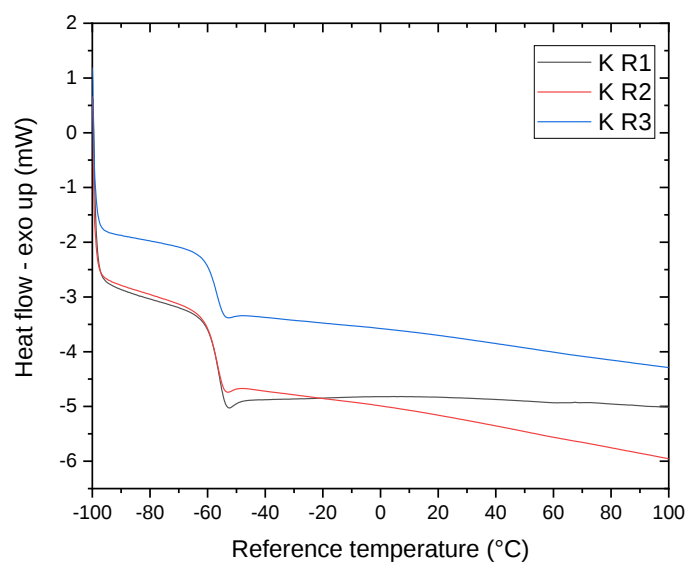


Figure S 14: DSC thermograms of K B with a heating rate of $10\text{ }^{\circ}\text{C}.\text{min}^{-1}$ from -100 to $100\text{ }^{\circ}\text{C}$ under N_2 following the first, second and third recycling steps.

TGA thermograms of C-K

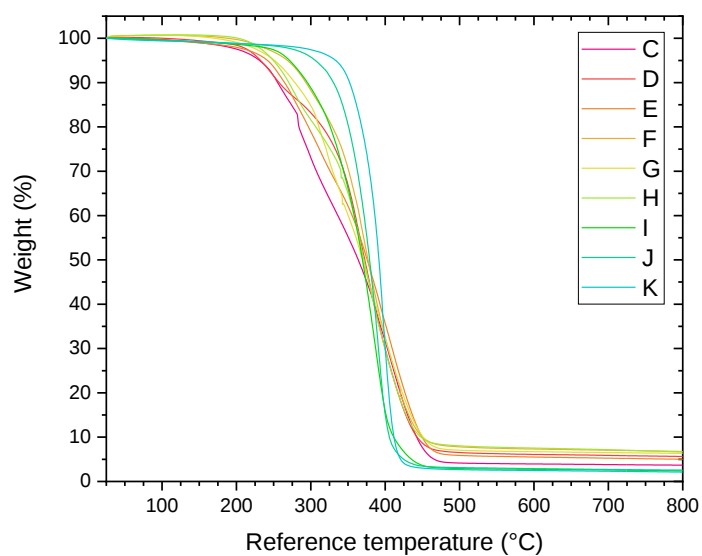


Figure S 15: TGA temperature ramp thermograms of C-K with a heating rate of $10\text{ }^{\circ}\text{C}.\text{min}^{-1}$ from $25\text{ }^{\circ}\text{C}$ to $800\text{ }^{\circ}\text{C}$ under N_2 .

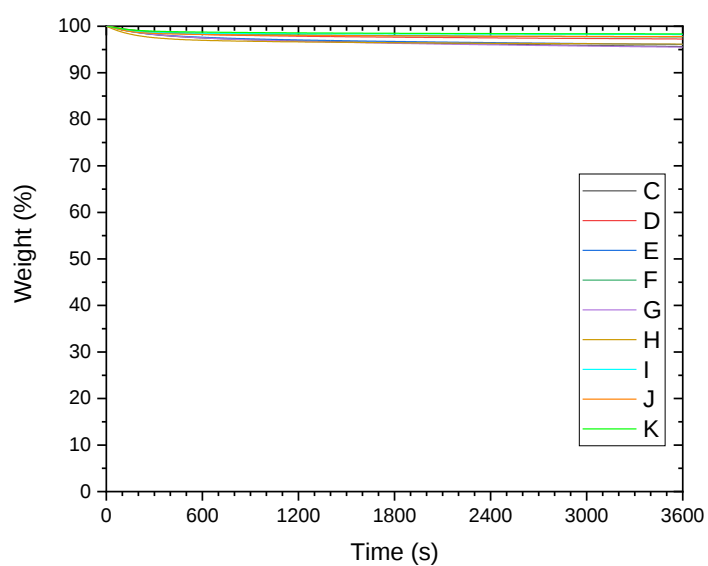


Figure S 16: Isothermal (150 °C) TGA thermograms of C-K under N_2 .

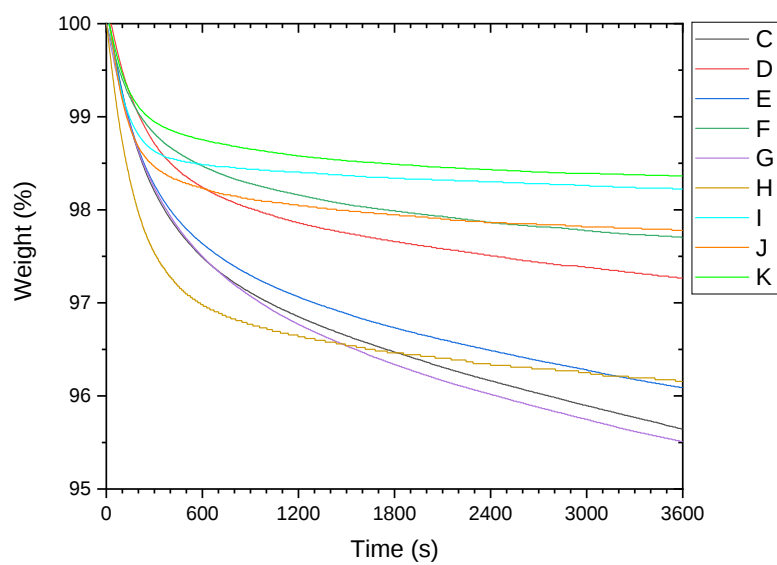


Figure S 17: Zoomed in (95-100% weight remaining) isothermal (150 °C) TGA thermograms of C-K under N_2 .

TGA thermograms of I, J and K recycled networks

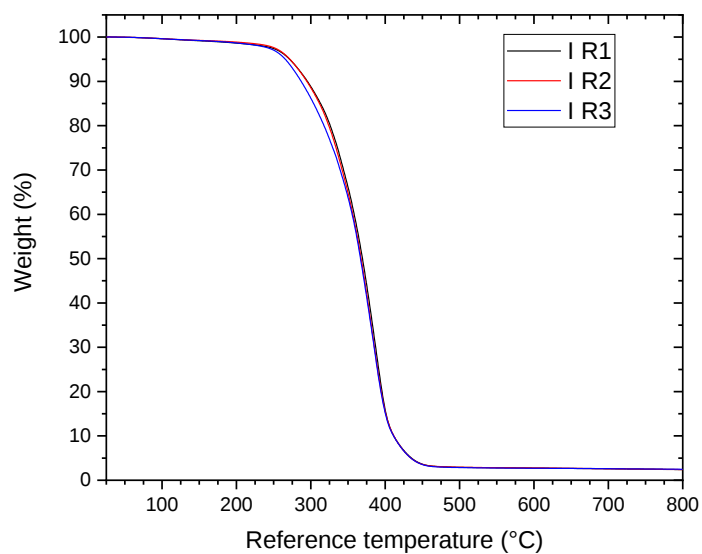


Figure S 18: TGA temperature ramp thermograms of I with a heating rate of $10\text{ }^{\circ}\text{C}.\text{min}^{-1}$ from $25\text{ }^{\circ}\text{C}$ to $800\text{ }^{\circ}\text{C}$ under N_2 following the first, second and third recycling steps.

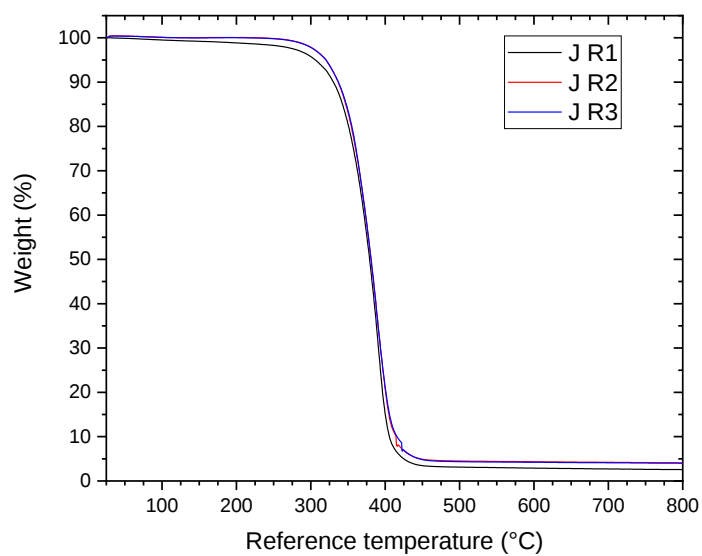


Figure S 19: TGA temperature ramp thermograms of J with a heating rate of $10\text{ }^{\circ}\text{C}.\text{min}^{-1}$ from $25\text{ }^{\circ}\text{C}$ to $800\text{ }^{\circ}\text{C}$ under N_2 following the first, second and third recycling steps.

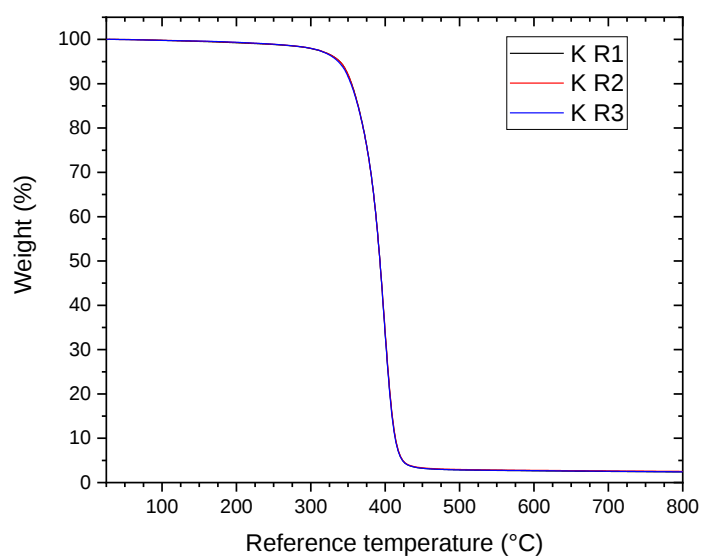


Figure S 20: TGA temperature ramp thermograms of K with a heating rate of 10 °C.min⁻¹ from 25 °C to 800 °C under N₂ following the first, second and third recycling steps.

Additional soluble fraction data of networks C-K

Table S 1: Soluble fraction data for networks C-K, obtained by refluxing a piece of the processed material in THF for 24 hours, before drying under vacuum at 70 °C.

	Soluble fraction %
C	8.5
D	13.7
E	0.4
F	0.6
G	6.7
H	7.1
I	10.5
J	11.9
K	7.2

Rheology data

Stress relaxation and Arrhenius plots of C-H

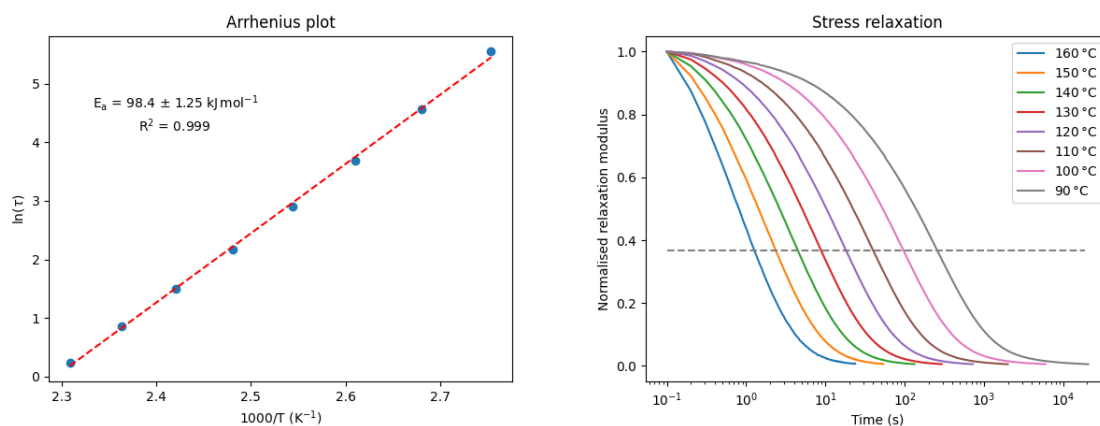


Figure S 21: Left) Arrhenius plot and right) normalised stress relaxation plot of C.

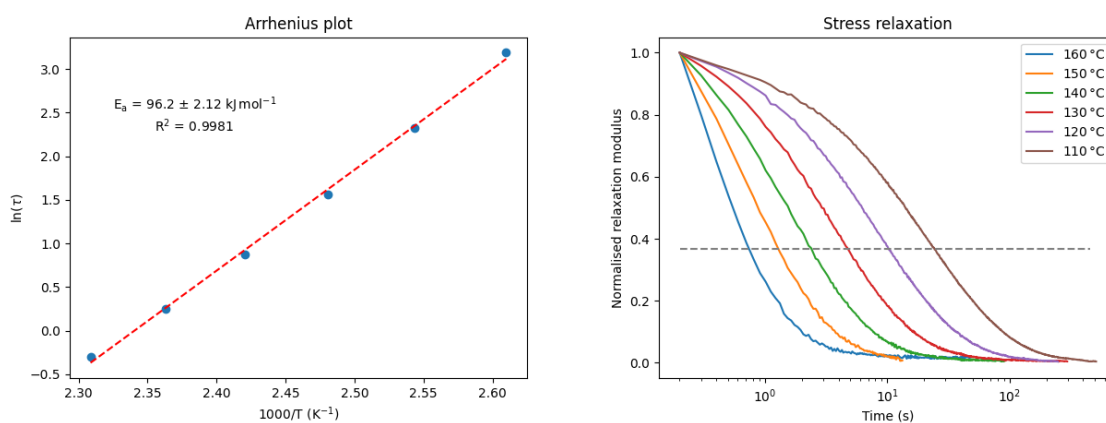


Figure S 22: Left) Arrhenius plot and right) normalised stress relaxation plot of D.

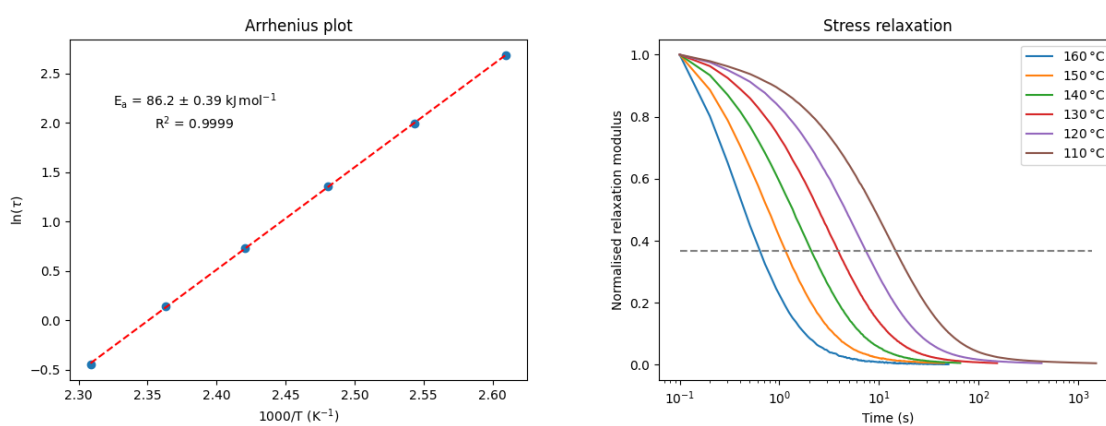


Figure S 23: Left) Arrhenius plot and right) normalised stress relaxation plot of E.

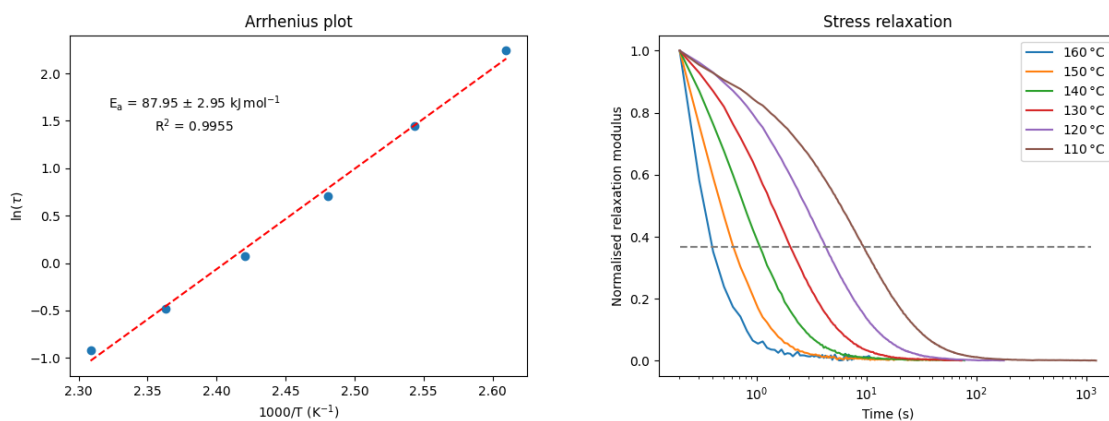


Figure S 24: Left) Arrhenius plot and right) normalised stress relaxation plot of F.

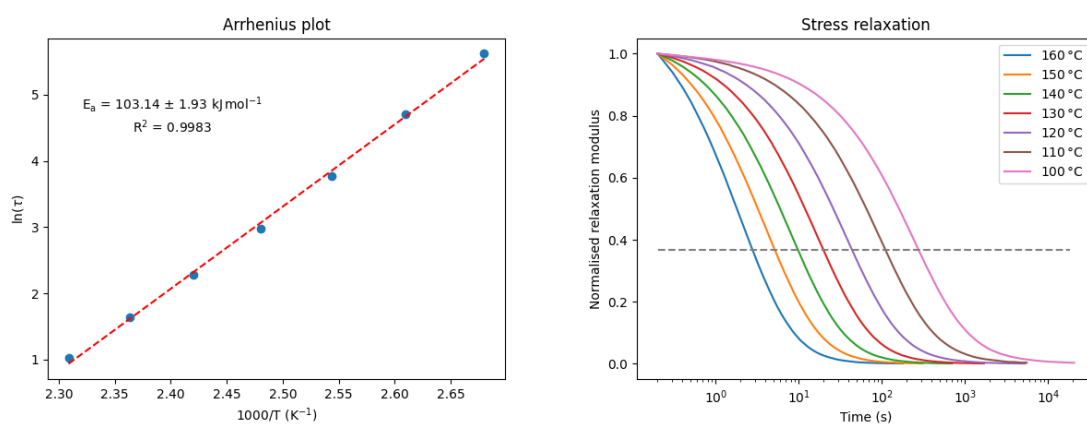


Figure S 25: Left) Arrhenius plot and right) normalised stress relaxation plot of G.

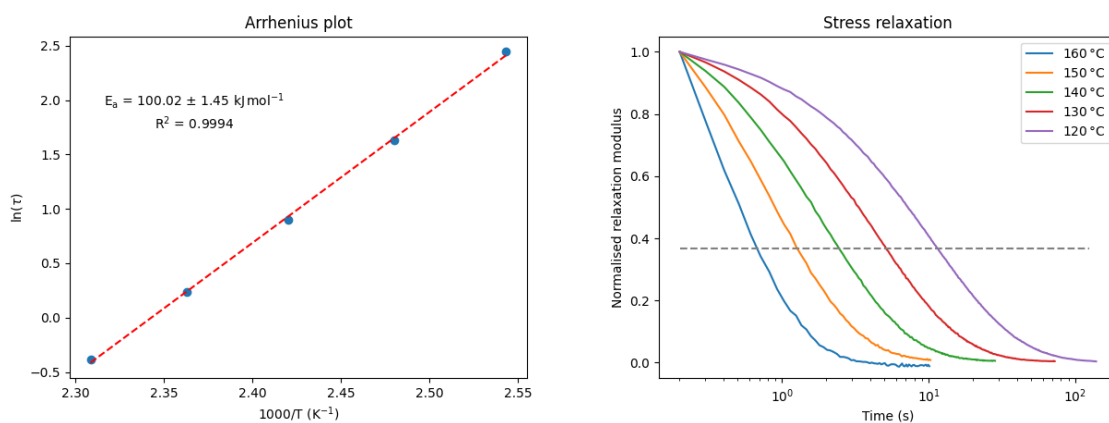


Figure S 26: Left) Arrhenius plot and right) normalised stress relaxation plot of H.

Arrhenius plots of I, J and K

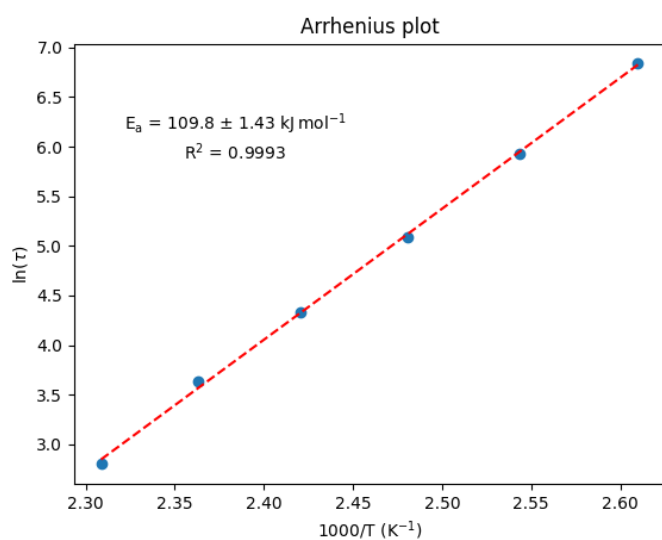


Figure S 27: Arrhenius plot of I.

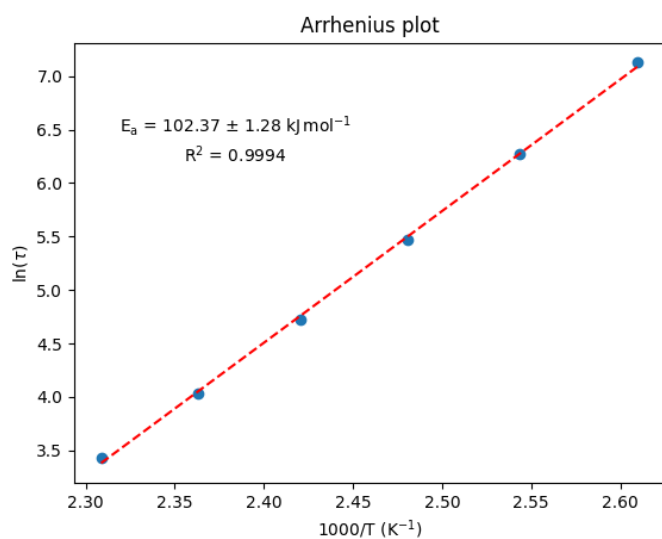


Figure S 28: Arrhenius plot of J.

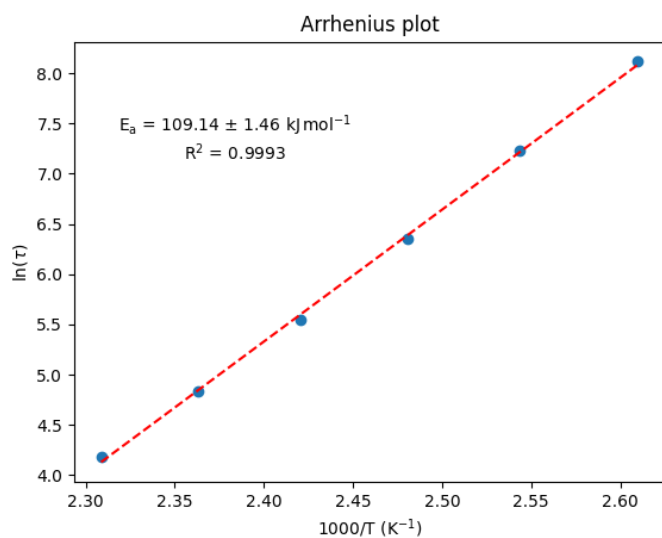


Figure S 29: Arrhenius plot of K.

Rheological analysis of recycled networks I, J, and K (R1-R3)

Stress relaxation and Arrhenius plots

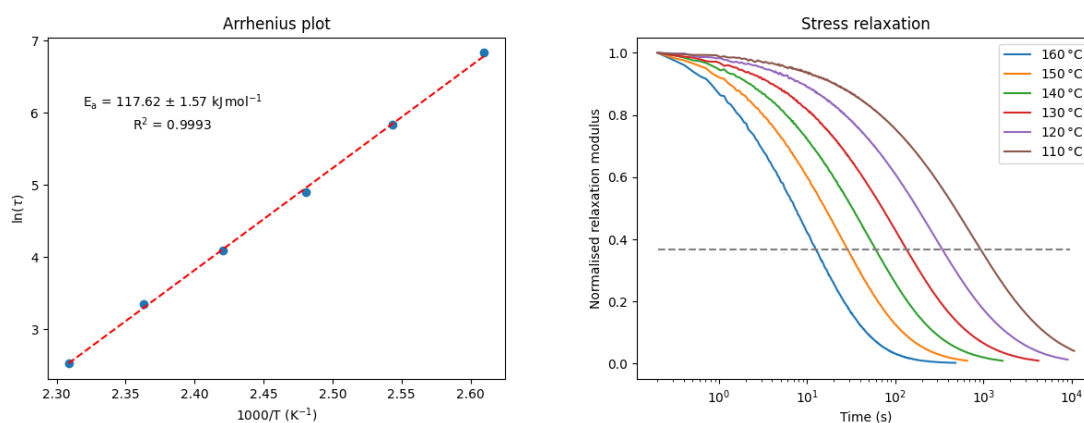


Figure S 30: Left) Arrhenius plot and right) normalised stress relaxation plot of I after the third recycling step.

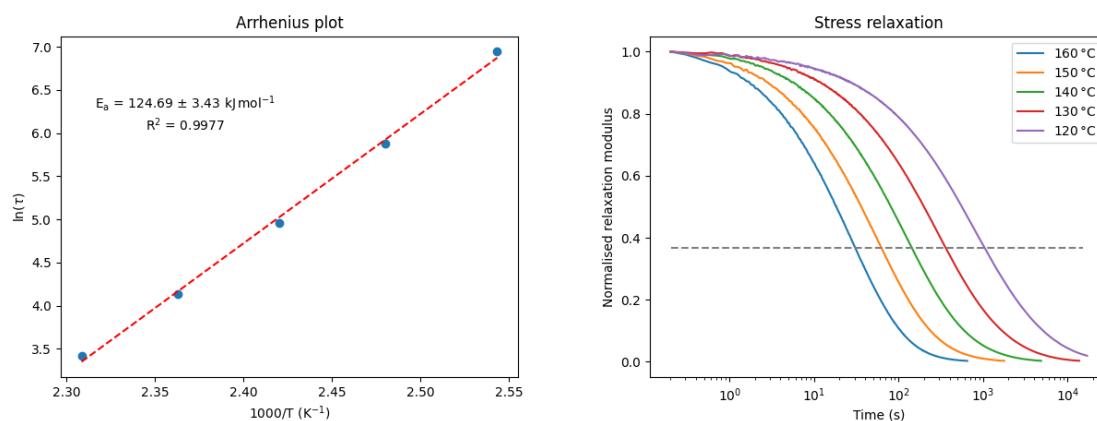


Figure S 31: Left) Arrhenius plot and right) normalised stress relaxation plot of J after the third recycling step.

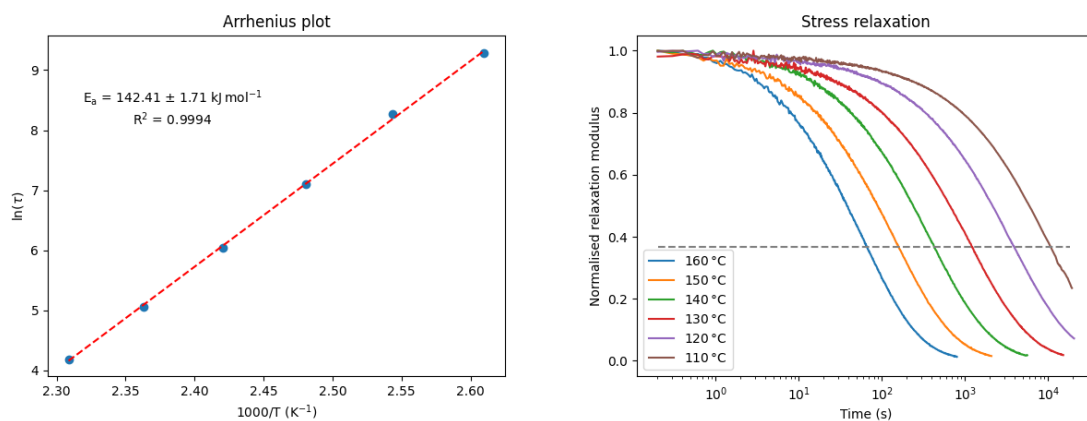


Figure S 32: Left) Arrhenius plot and right) normalised stress relaxation plot of K after the third recycling step.