

Two-dimensional Raman correlation spectroscopy reveals molecular structural changes during temperature-induced self-healing in polymers based on the Diels-Alder reaction

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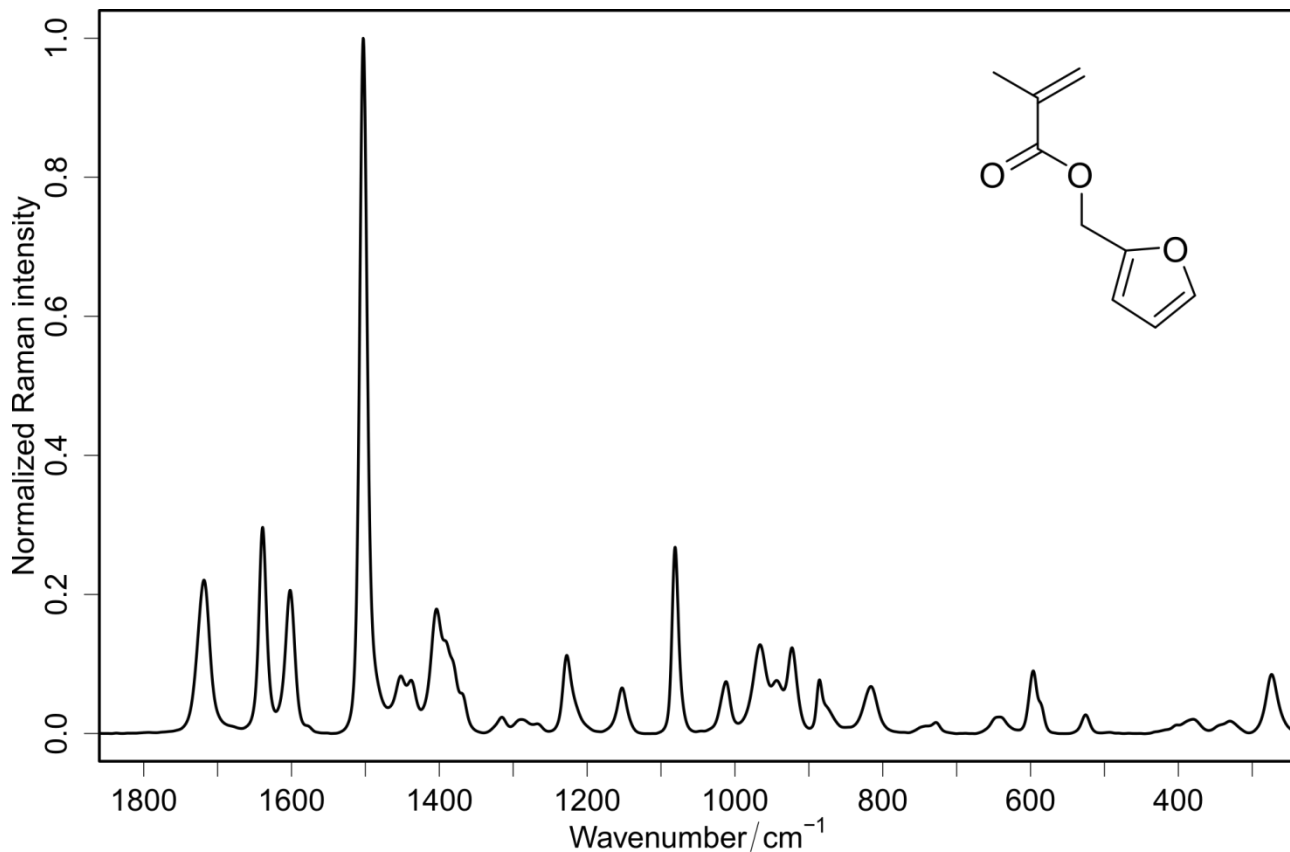


Figure S1 Experimental FT-Raman spectrum of furfuryl methacrylate (FMA). The spectrum consists of 724 combined single spectra. The resolution is 4 cm⁻¹. The spectrum is background corrected using a SNIP algorithm and normalized to the peak at 1503 cm⁻¹. Band assignment: 1718 (ν(C=O) methacrylate), 1639 (ν(C=C) methacrylate), 1602 (ν(C=C) furan), 1503 (ν(C=C) furan), 1081 (ν(ring) furan) cm⁻¹.

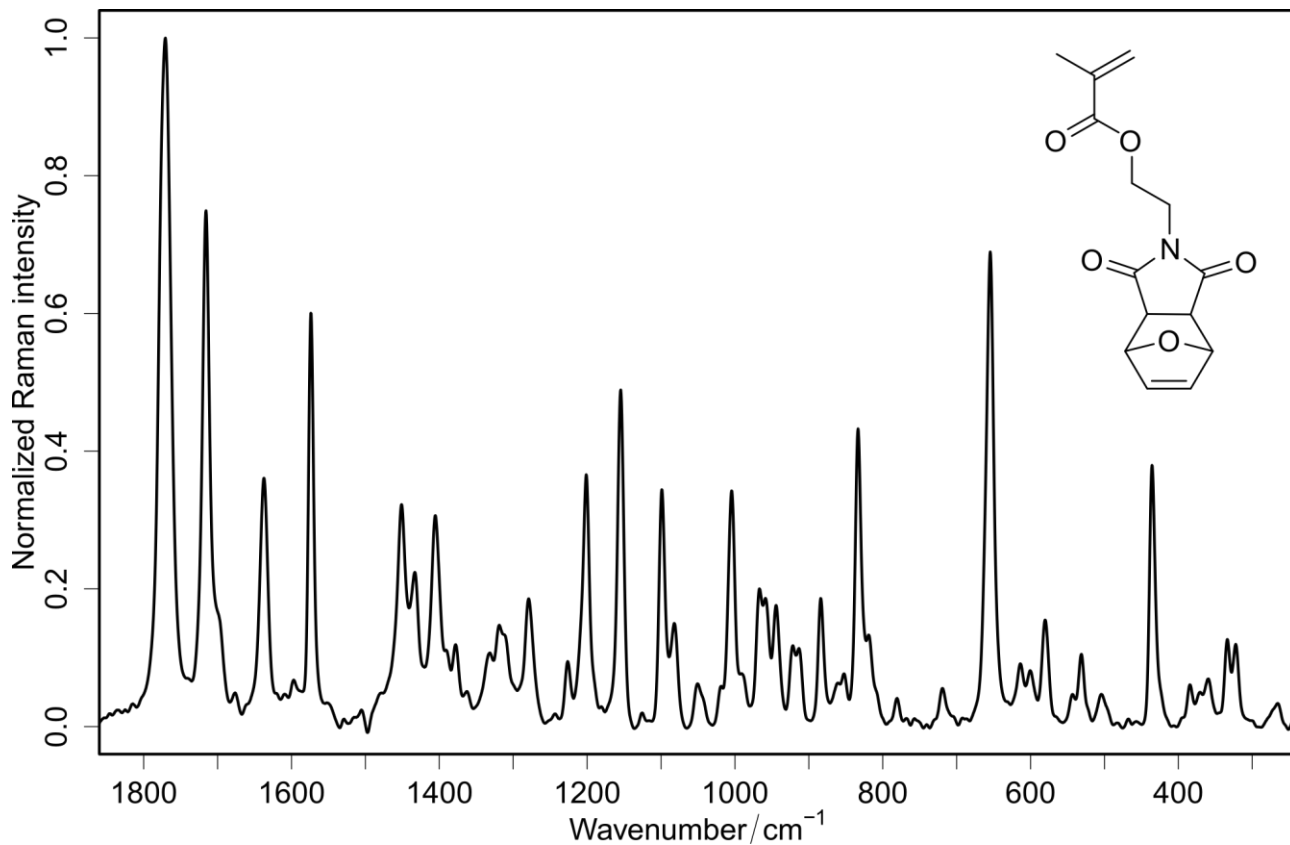


Figure S2 Experimental FT-Raman spectrum of furan protected maleimide methacrylate (MIMA). The spectrum consists of 724 combined single spectra. The resolution is 4 cm^{-1} . The spectrum is background corrected using a SNIP algorithm and normalized to the peak at 1772 cm^{-1} . Band assignment: $1772\text{ (}v_s(\text{C}=\text{O})\text{ maleimide)}$, $1716\text{ (}v(\text{C}=\text{O})\text{ methacrylate \& }v_{as}(\text{C}=\text{O})\text{ maleimide)}$, $1638\text{ (}v(\text{C}=\text{C})\text{ methacrylate)}$, $1574\text{ (}v(\text{C}=\text{C})\text{ maleimide)}$, $655\text{ (}\tau(\text{C}-\text{N}-\text{C})\text{ maleimide)}$ cm^{-1} .

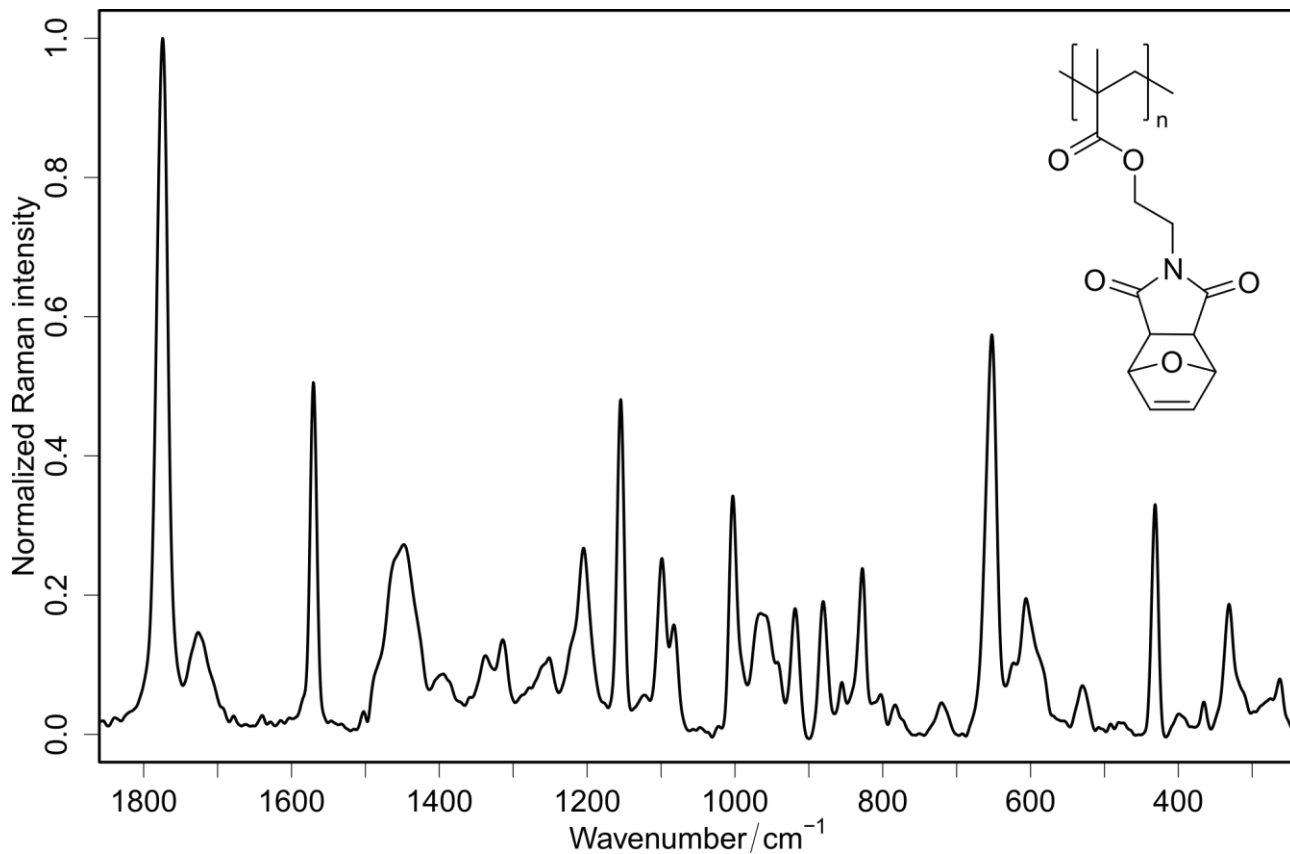


Figure S3 Experimental FT-Raman spectrum of furan protected poly(maleimide methacrylate) (P(MIMA)). The spectrum consists of 724 combined single spectra. The resolution is 4 cm^{-1} . The spectrum is background corrected using a SNIP algorithm and normalized to the peak at 1775 cm^{-1} . Band assignment: $1775\text{ (}\nu_s(\text{C}=\text{O})\text{ maleimide)}$, $1727\text{ (}\nu(\text{C}=\text{O})\text{ methacrylate \& } \nu_{\text{as}}(\text{C}=\text{O})\text{ maleimide)}$, $1571\text{ (}\nu(\text{C}=\text{C})\text{ maleimide)}$, $653\text{ (}\tau(\text{C}-\text{N}-\text{C})\text{ maleimide)}$ cm^{-1} .

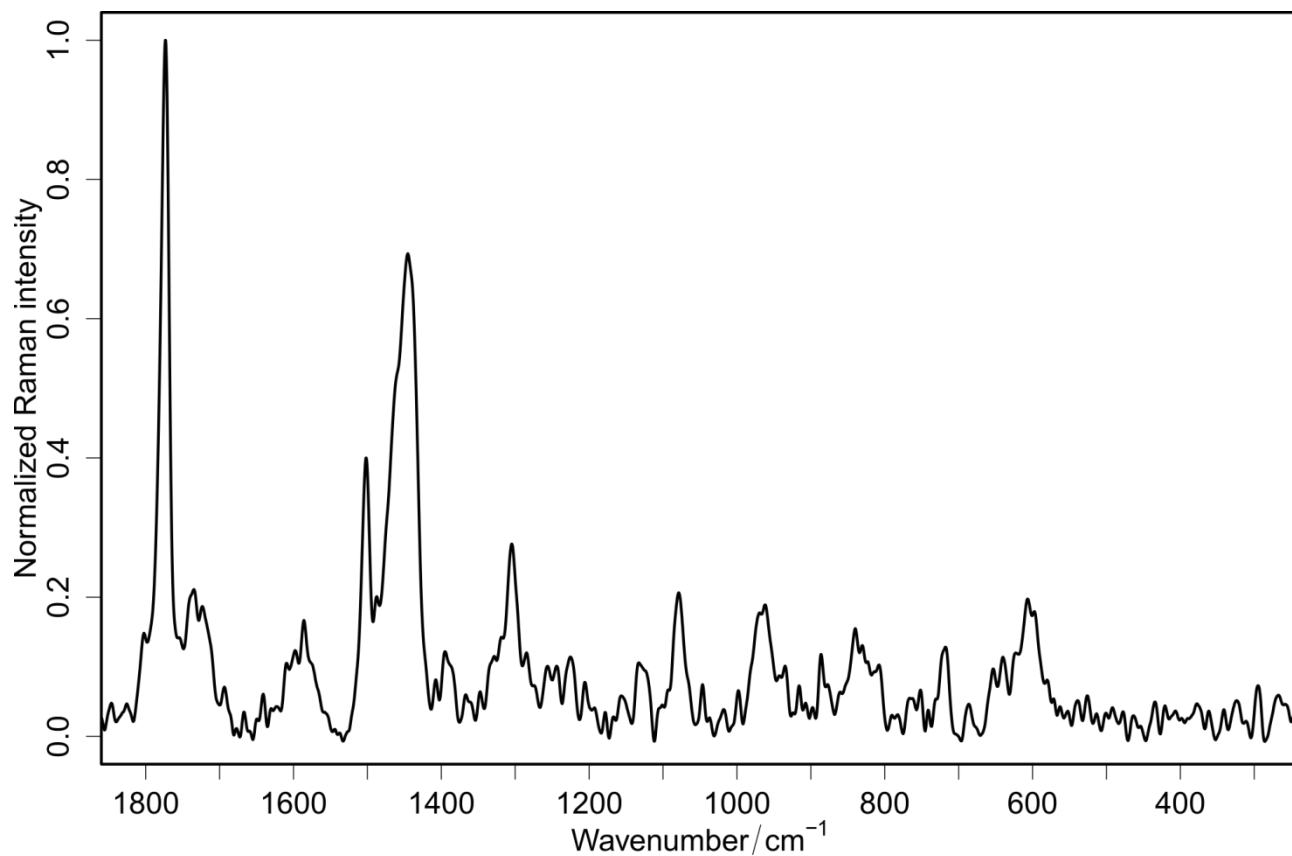


Figure S4 Experimental FT-Raman spectrum copolymer P(LMA-*co*-FMA-*co*-MIMA) with monomer ratio of 1:1:1 (**P1**). The spectrum consists of 72 combined single spectra. The resolution is 4 cm⁻¹. The spectrum is background corrected using a SNIP algorithm and normalized to the peak at 1772 cm⁻¹. Band assignment: 1772 (ν_s(C=O) maleimide), 1716 (ν(C=O) methacrylate & ν_{as}(C=O) maleimide), 1501 (ν(C=C) furan) cm⁻¹.

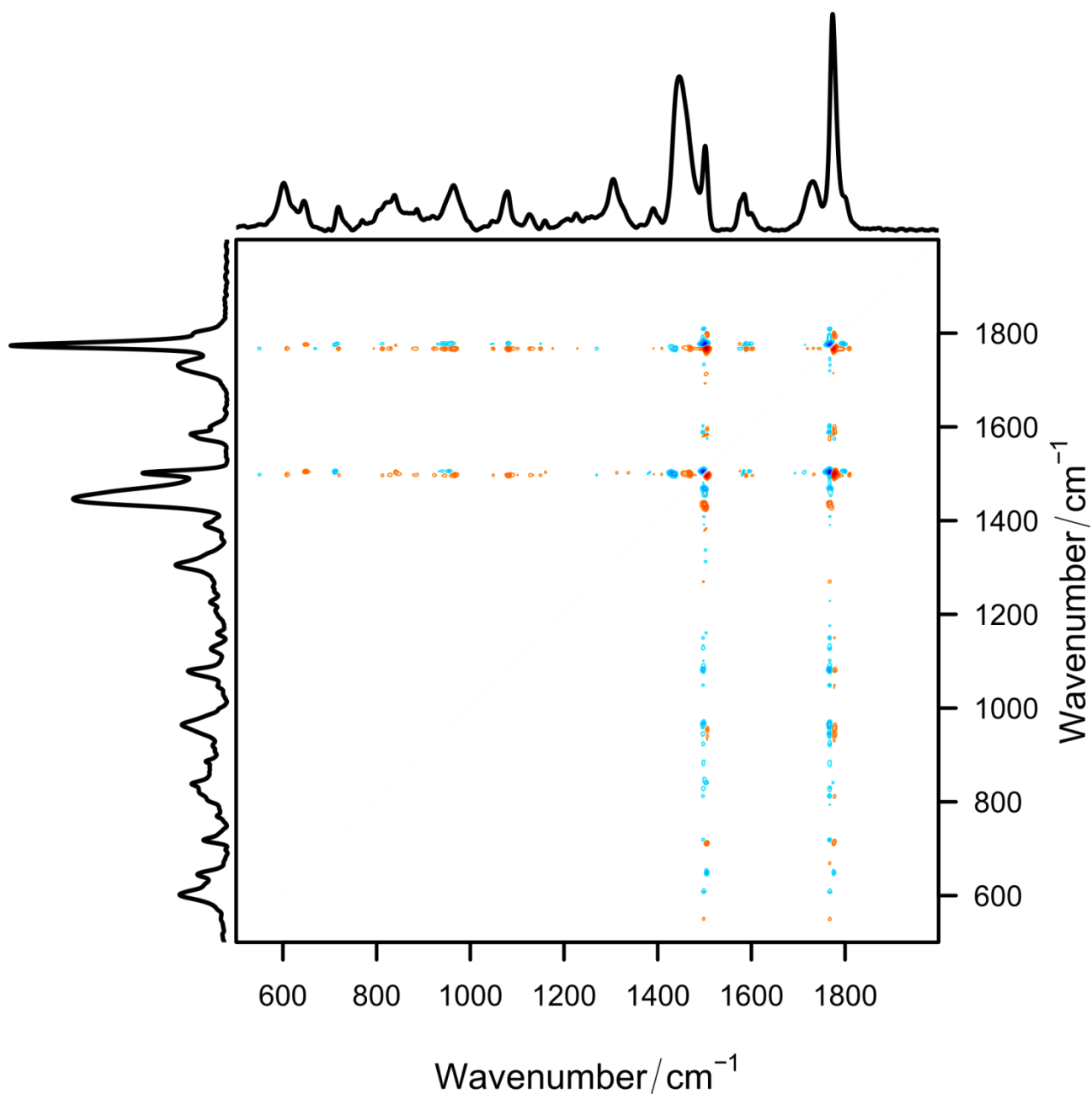


Figure S5 Asynchronous 2D Raman correlation spectra of P(LMA-*co*-FMA-*co*-MIMA) with monomer ratio of 1:1:1 (**P1**) between 110 and 160 °C (in steps of 10 °C) in the wavenumber region 500 - 2000 cm⁻¹. The spectrum plotted at the top and the left is the respective reference Raman spectrum at 110 °C. Red colour indicates positive peaks, while blue shows negative ones.