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Supporting Information

for

"Clicked" fluoropolymer elastomers as robust materials for potential microfluidic device applications

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Thermal Stability.

The PFPE-based elastomers prepared in this study showed improved thermal stability as compared with traditional PDMS. Quantitative thermal stability analysis was conducted by thermogravimetric analysis (TGA) (Figure S1), showing that the material has no appreciable thermal decomposition at temperature below 350 ºC.

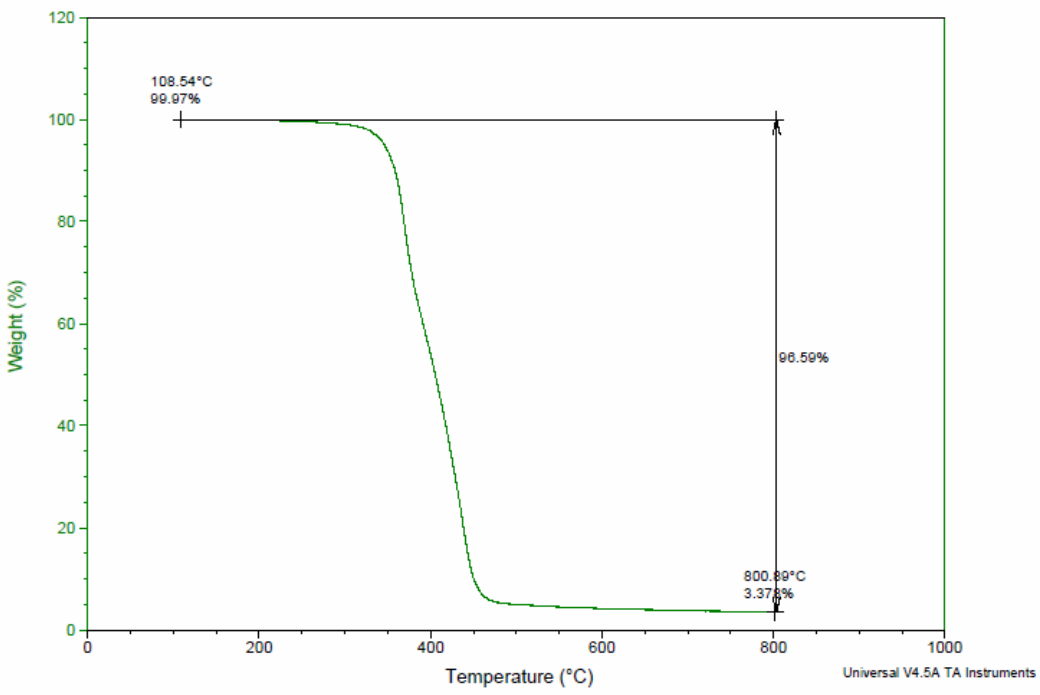

Figure S1. TGA analysis of "clicked" PFPE elastomer. Note: TGA was performed on a TA instruments Q500. Samples (~5 mg) were equilibrated at 105 °C before ramping up to 800°C at a rate of 20 °C/min. The experiments were done in air.

Mechanical Properties

Instron tensile tests of the clicked PFPE elastomer revealed a typical rubber-like stress-strain behavior (Figure S2), with a strain at break about 175 % at a stress of ca. 2.1 MPa. The Young's modulus (E) measured from the initial slope on stress-strain curve was 3.5 MPa, which is similar to previously reported tensile moduli of cured PFPE and PDMS materials (3.9 MPa and 2.4 MPa respectively). Rheometric measurement confirms the PFPE gel as robust elastomer with storage modulus of ~ 1 MPa (Figure S3). Finally dynamic mechanical analysis (DMA) reveals that the PFPE elastomer has a glass transition temperature below room temperature (-10°C), as shown in Figure S4.

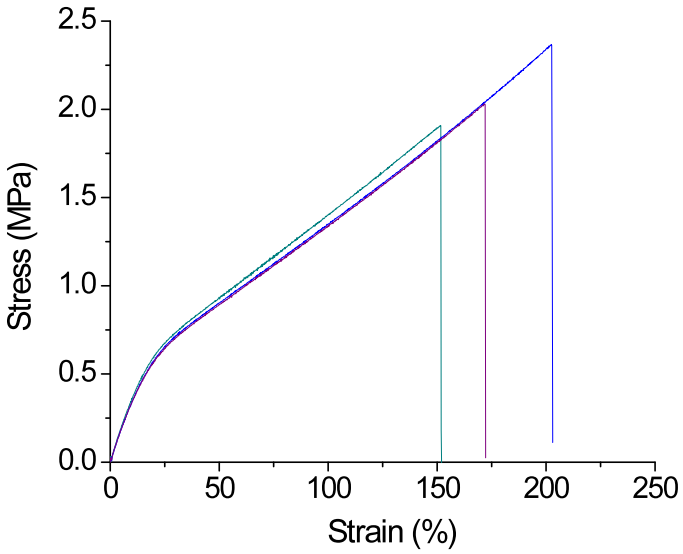

Figure S2. Stress-strain curves of the PFPE elastomer. Data for three specimens are shown to illustrate the reproducibility. Note: Standard stress/strain experiments were performed using an Instron 3365 machine. The specimen were stamped out from solution cast films and extended at 50 mm/min at room temperature. The measurement was repeated three times. Youngs Modulus (E) was determined from the initial stress-strain slope.

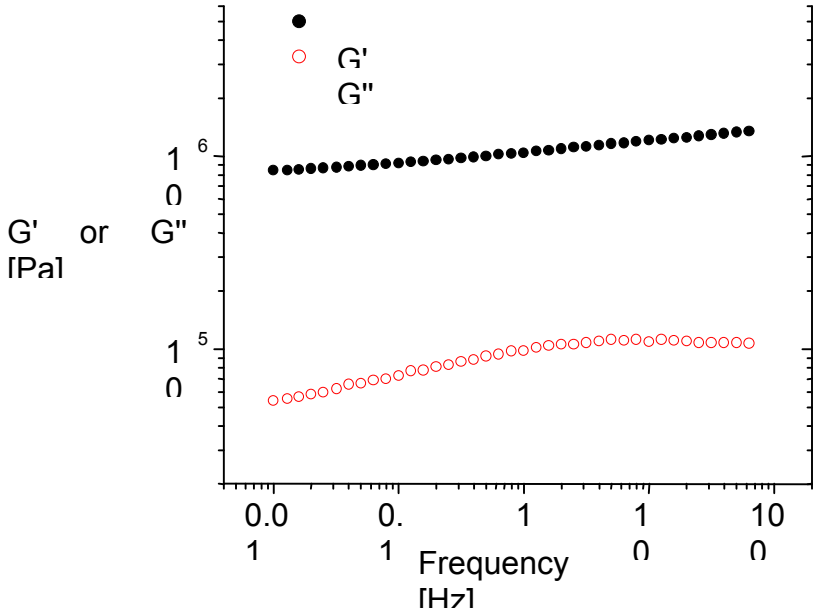

Figure S3. Frequency sweep experiment on a film (thickness: ca. 1.5 mm) of the PFPE elastomer. The plot shows the dependency of storage (G') and loss modulus (G'') on the frequency. Note: Storage modulus (G') and loss modulus (G") of the final cross-linked polymer material were determined at 25 °C and at different frequencies (0.01 – 100 Hz) in standard frequency sweep measurements (0.1 % strain, 5 N normal force) using an AR G2 Rheometer from TA Instruments (12 mm steel plate).

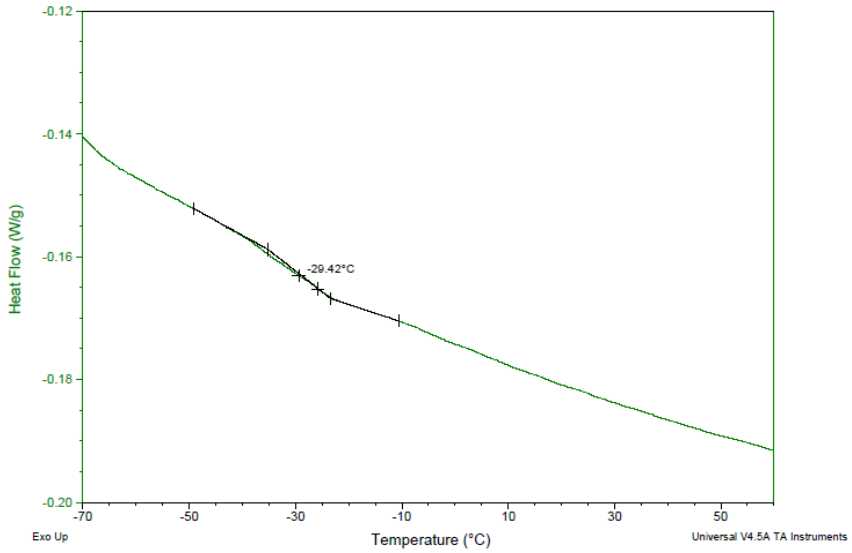

Figure S4. Differential scanning calorimetry of the Gel Material. The shown curve corresponds to the second heat cycle in a heat-cool-heat experiment. Note: DMA was carried out on a TA instruments Q800 using a standard temperature sweep experiment between -80 and 80 °C. Samples were cut into 6 mm x 3 mm × 0.5 mm (length × width × thickness) rectangles. The initial force was 10 mN, and the heating rate was 3 °C/min at a constant frequency of 3.2 Hz. The glass transition temperatures (T_g) was determined at the peak maximum of the tan δ signal.