Supporting Information

From Vinyl to Allyl: How a Single-Carbon Difference Alters Glass Surface Architecture, Reactivity and Function

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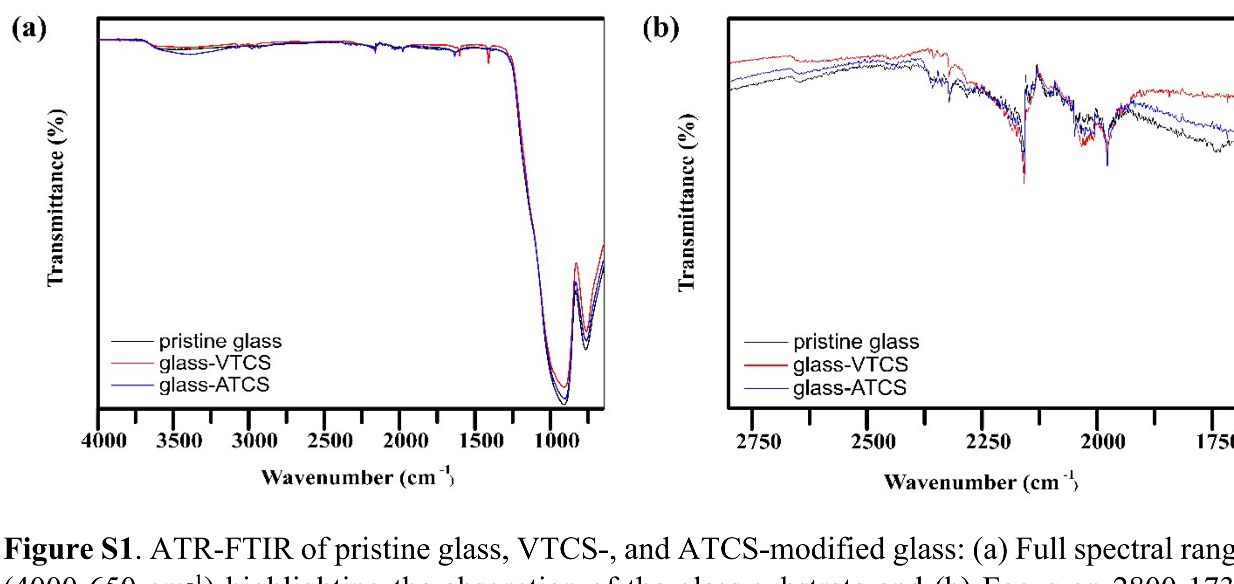

Figure S1. ATR-FTIR of pristine glass, VTCS-, and ATCS-modified glass: (a) Full spectral range (4000-650 cm^{-1}) highlighting the absorption of the glass substrate and (b) Focus on 2800-1730 cm^{-1} highlighting the absence of any characteristic vibrational peak.

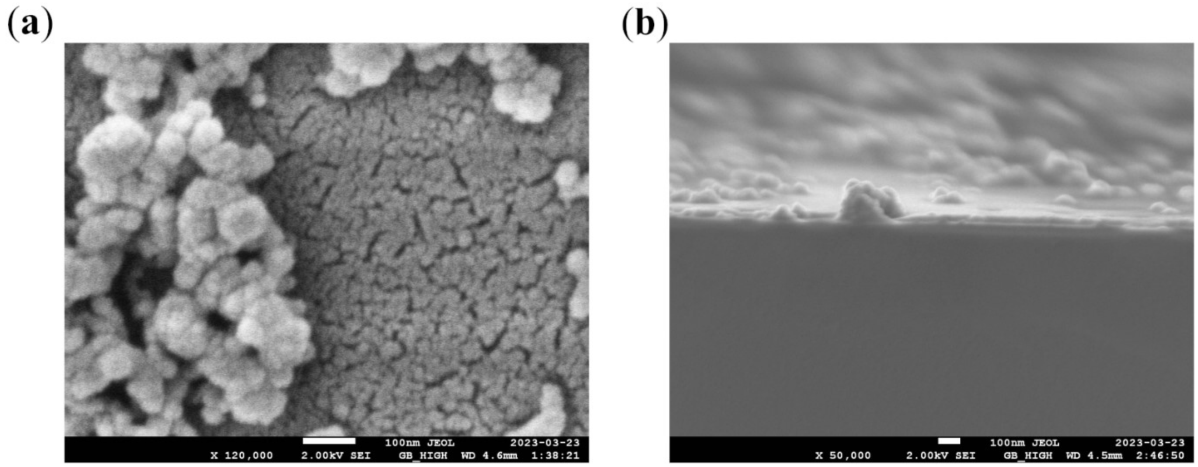

Figure S2. SEM images of the ATCS-modified glass surface showing (a) a magnified top-view and (b) a cross-sectional view.

Photo-induced Force Microscopy

The modified glass samples were attached to 12 mm *d* magnetic sample holding discs with double sided adhesive tape. The sample surface nanometer resolved simultaneous topography and infrared spectroscopy were examined with the VistaScope (MolecularVista.Inc, CA, USA) scanning probe microscope. The plasmonic probe was a coated PtIr atomic force microscope Si_3N_4 cantilevered tip. The infrared spectra wave-range was from 1250 to 1910 cm^{-1} and signals corresponding to the uppermost molecules were mapped to correspond the localization of the molecules within the topographical feature at a laser intensity of 5% the total laser power, ≤ 1 mW. The samples were scanned a total of 256 lines at 1 Hz in non-contact mode.

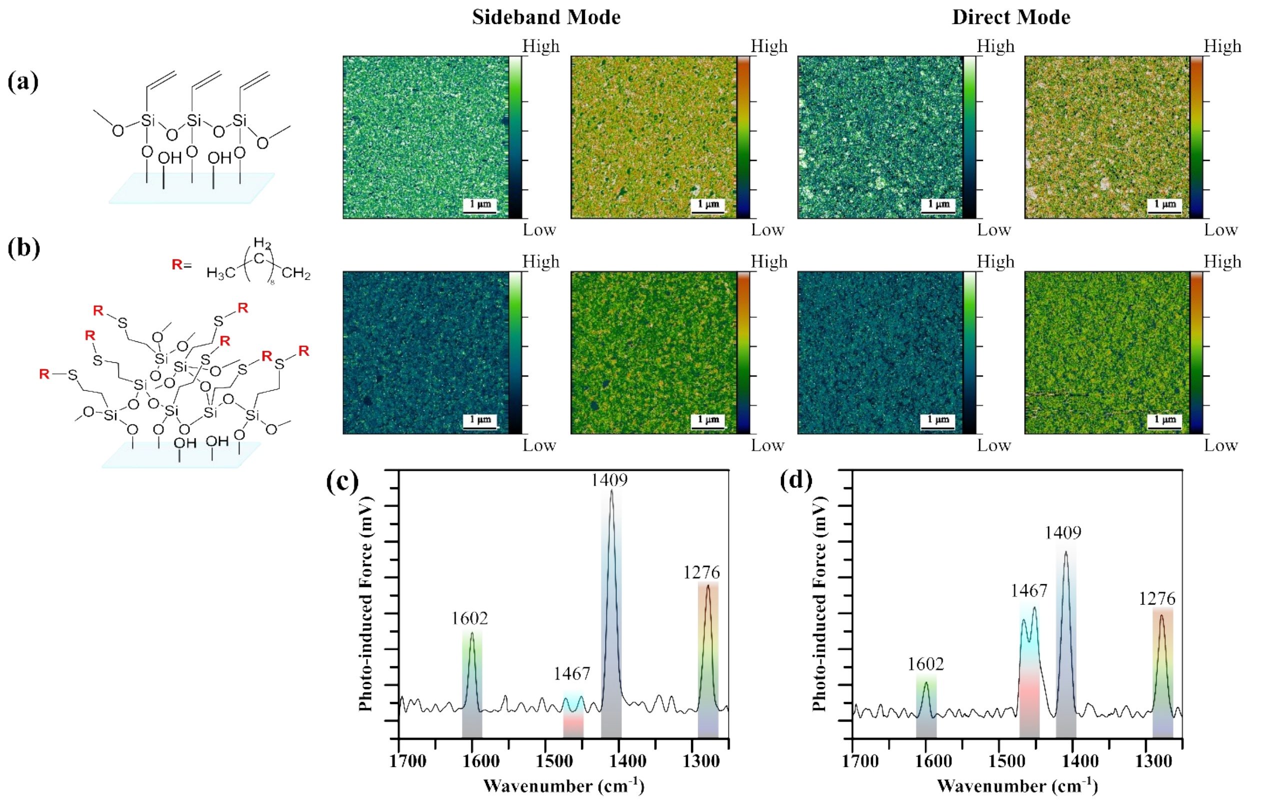

Figure S3. PiFM chemical mapping and spectra images of glass surfaces modified with VTCS. (a) PiFM chemical mapping images before and (b) after functionalization, collected at 1602 cm^{-1} and 1276 cm^{-1} in sideband and direct modes. (c) PiFM spectra of VTCS-modified glass before and (d) after thiol-ene click reaction.

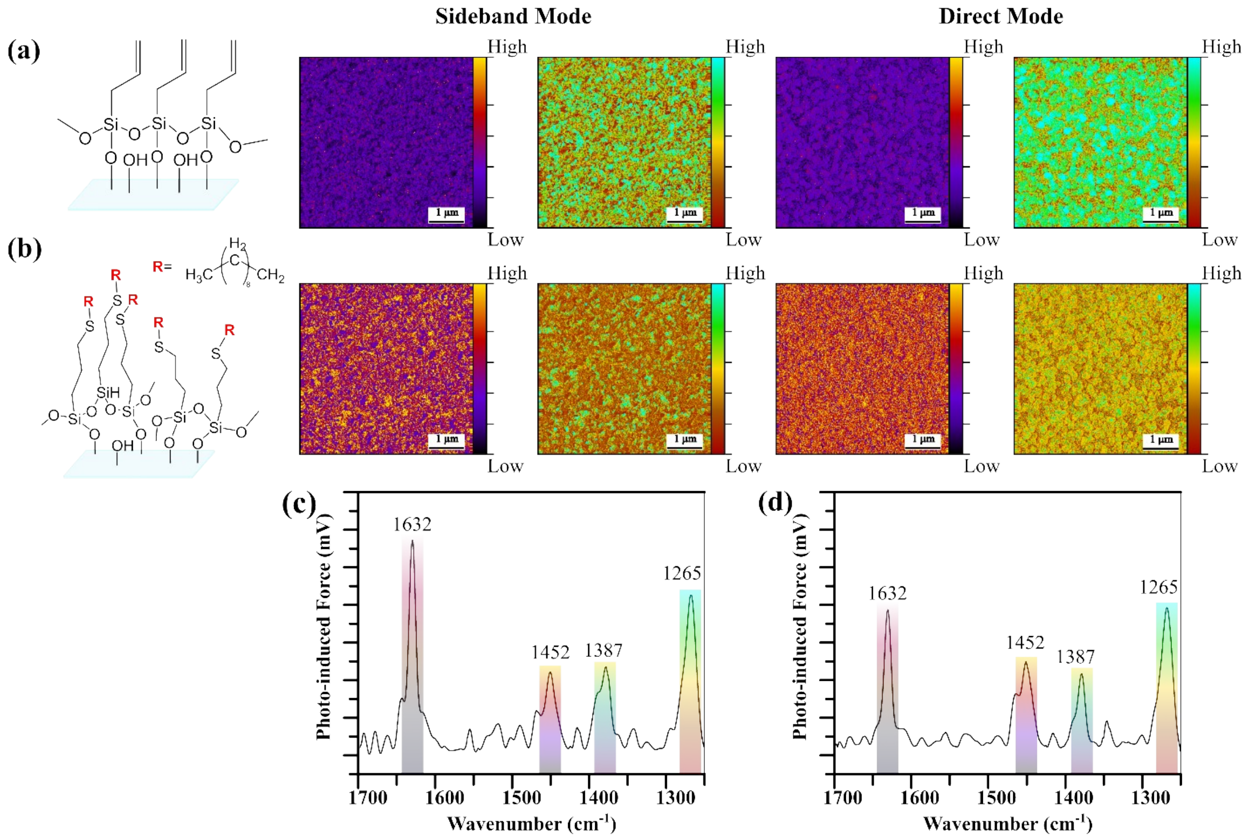

Figure S4. PiFM chemical mapping and spectra images of glass surfaces modified with ATCS. (a) PiFM chemical mapping images before and (b) after functionalization, collected at 1452 cm^{-1} and 1265 cm^{-1} in sideband and direct modes. (c) PiFM spectra of VTCS-modified glass before and (d) after thiol-ene click reaction.

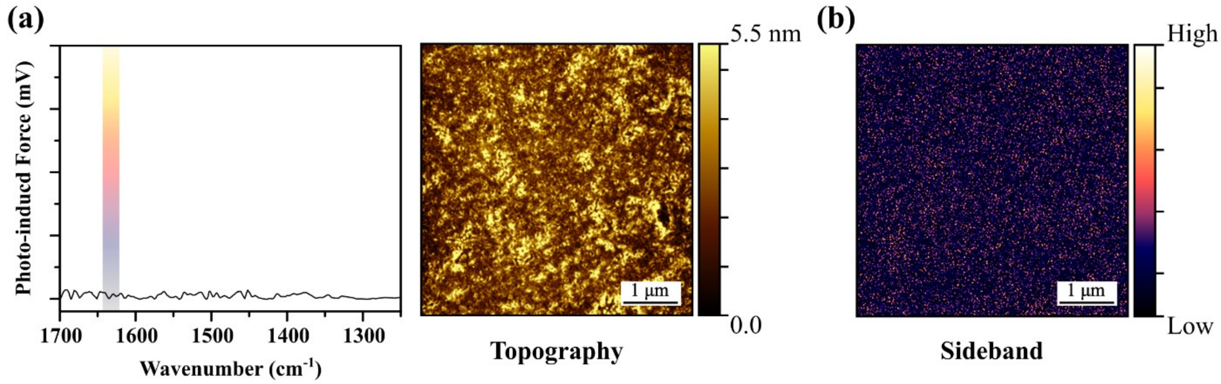

Figure S5. PiFM negative control measurements of the bare soda-lime glass substrate. (a) The averaged PiFM mid-infrared spectrum of the unmodified substrate shows no detectable signal in the 1700-1250 cm^{-1} range. (b) The corresponding PiFM map at the C=C stretching band of VTCS displays a uniformly low-intensity distribution across the surface, consistent with the absence of signal on the pristine substrate.

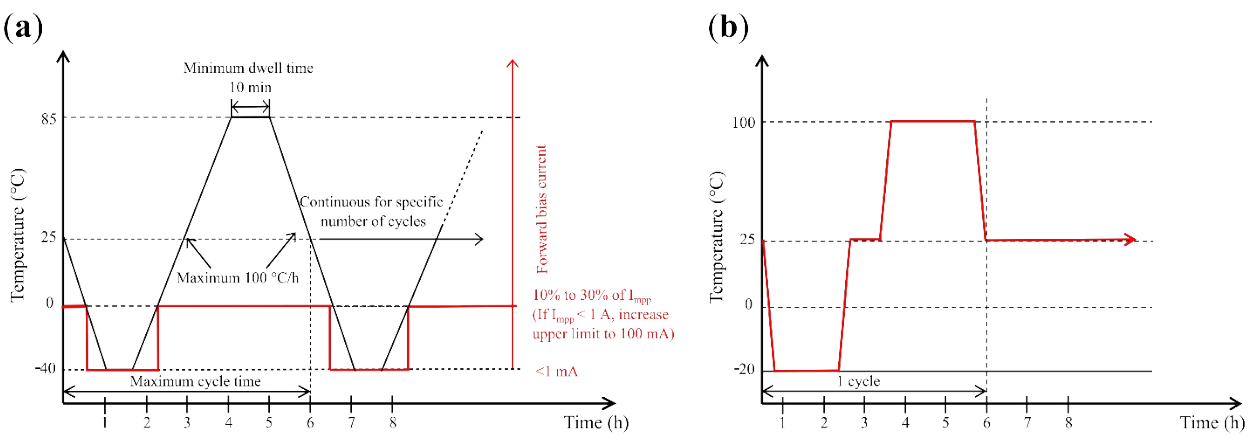

Figure S6. Thermal cycling test from IEC-61215-1-4-2021, and (b) our customized thermal cycling test.