Electronic Supplementary Material (ESI) for RSC Advances.

Supplementary Information

Oxygen Insensitive Thiol–Ene Photo–Click Chemistry for Direct Imprint Lithography of Oxides

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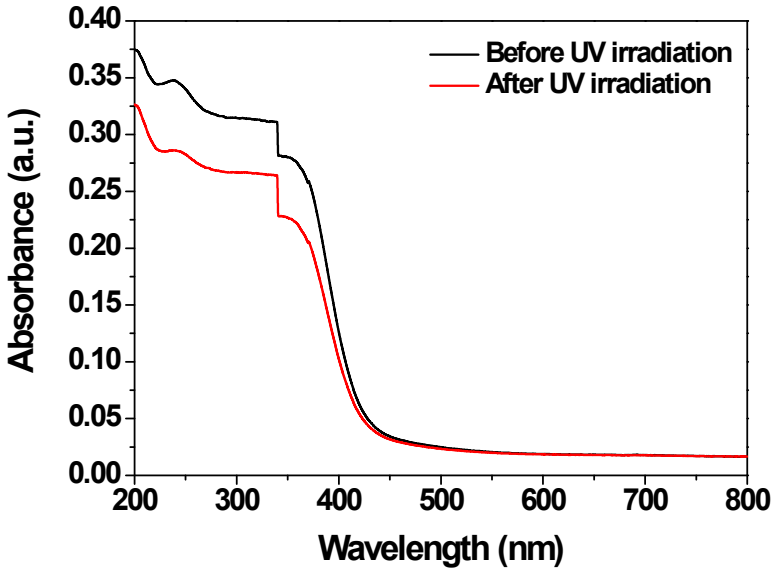

Figure S1. UV-visible absorbance spectra of TAP-0.5 thin film (coated over quartz substrate) before and after UV irradiation.

The UV-visible absorbance spectra of TAP-0.5 thin film before and after UV irradiation are shown in Figure S1. The film was found to be transparent in the visible region, while the absorbance gradually increased inside the UV region. After the UV exposure, the absorbance in the UV region was found to be slightly decreased, which could be attributed to the consumption of allyl double bonds.

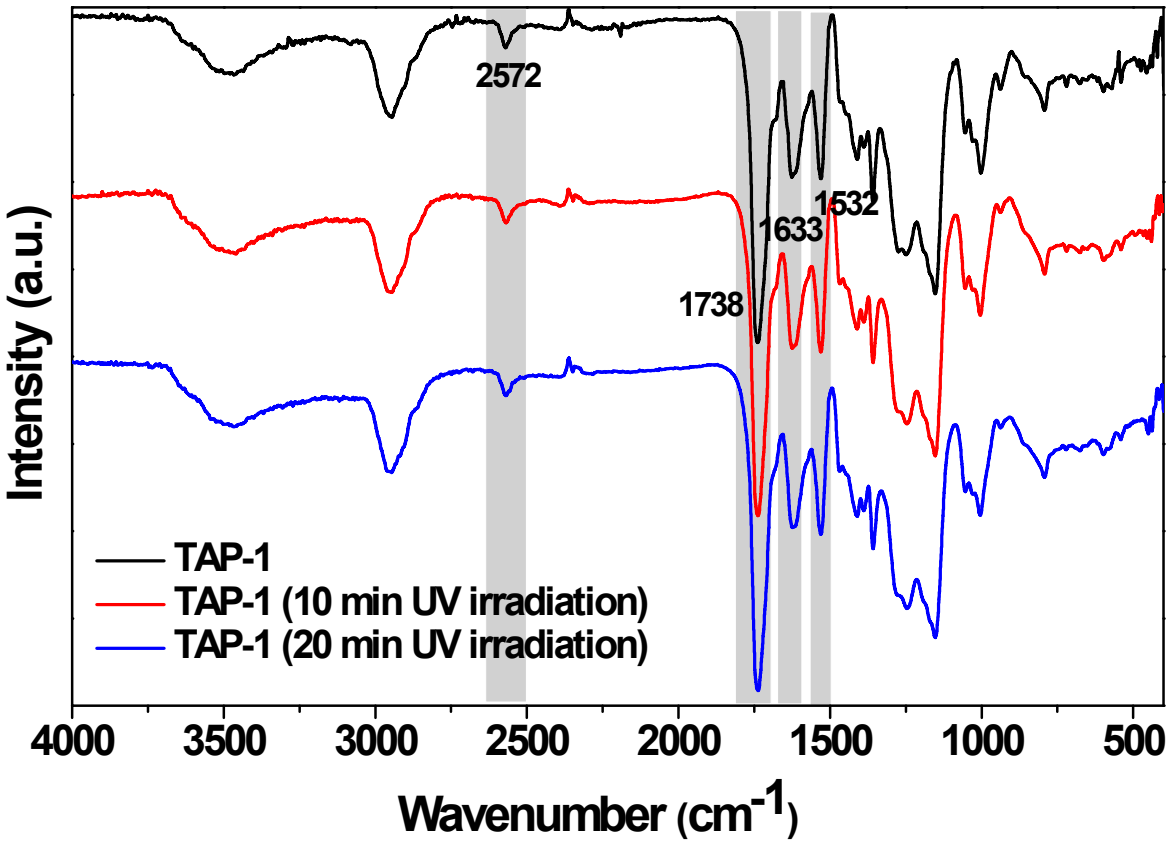

Figure S2. FT-IR study of thiol-ene photo-addition in the titanium-containing resin, TAP-1.0.

The FT-IR spectra of TAP-1 before and after UV irradiation are depicted in Figure S2. The presence of –SH group even after 20 min of UV exposure explains its poor performance. The FT-IR analyses therefore corroborate the poor photo-curability of stoichiometrically mixed allyl and thiol.

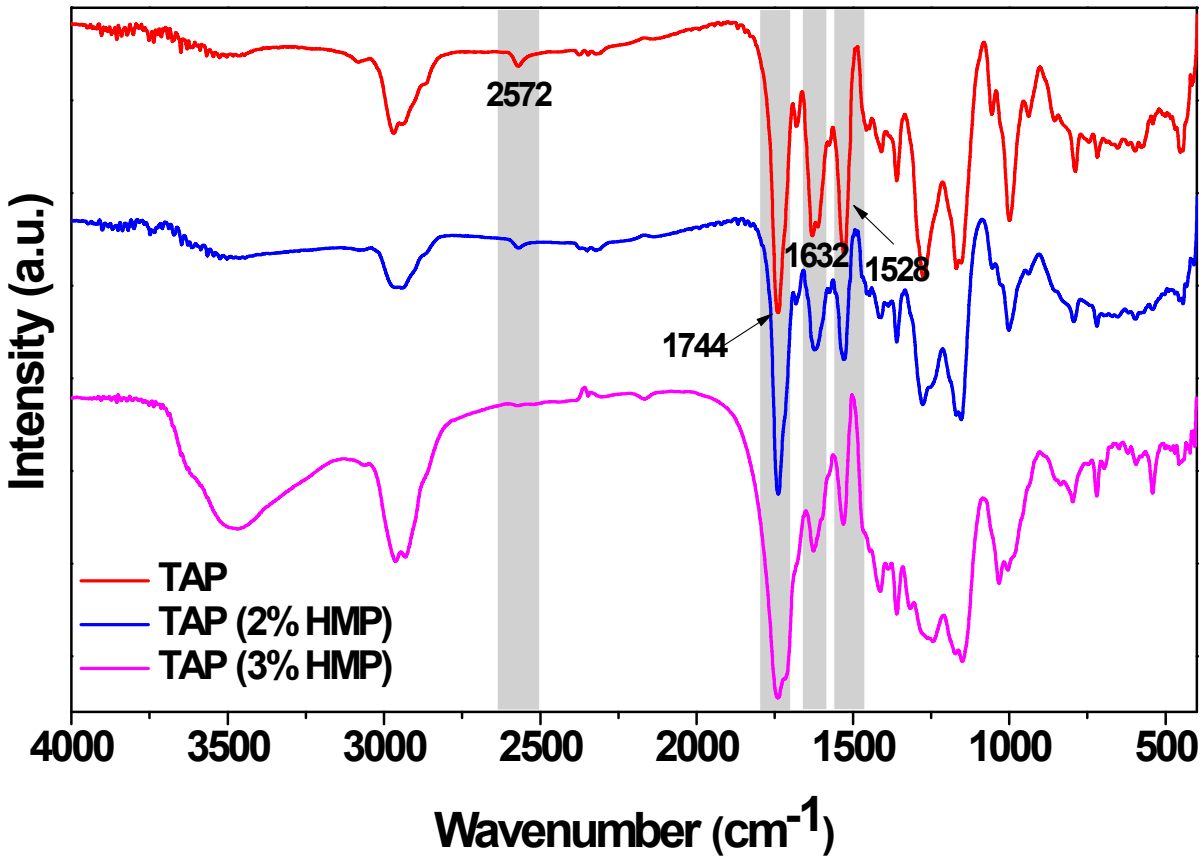

Figure S3. FT-IR analysis of TAP-0.5 without and with different amounts of HMP photo-initiator. The optimized loading of the photo-initiator was found to be 3%.

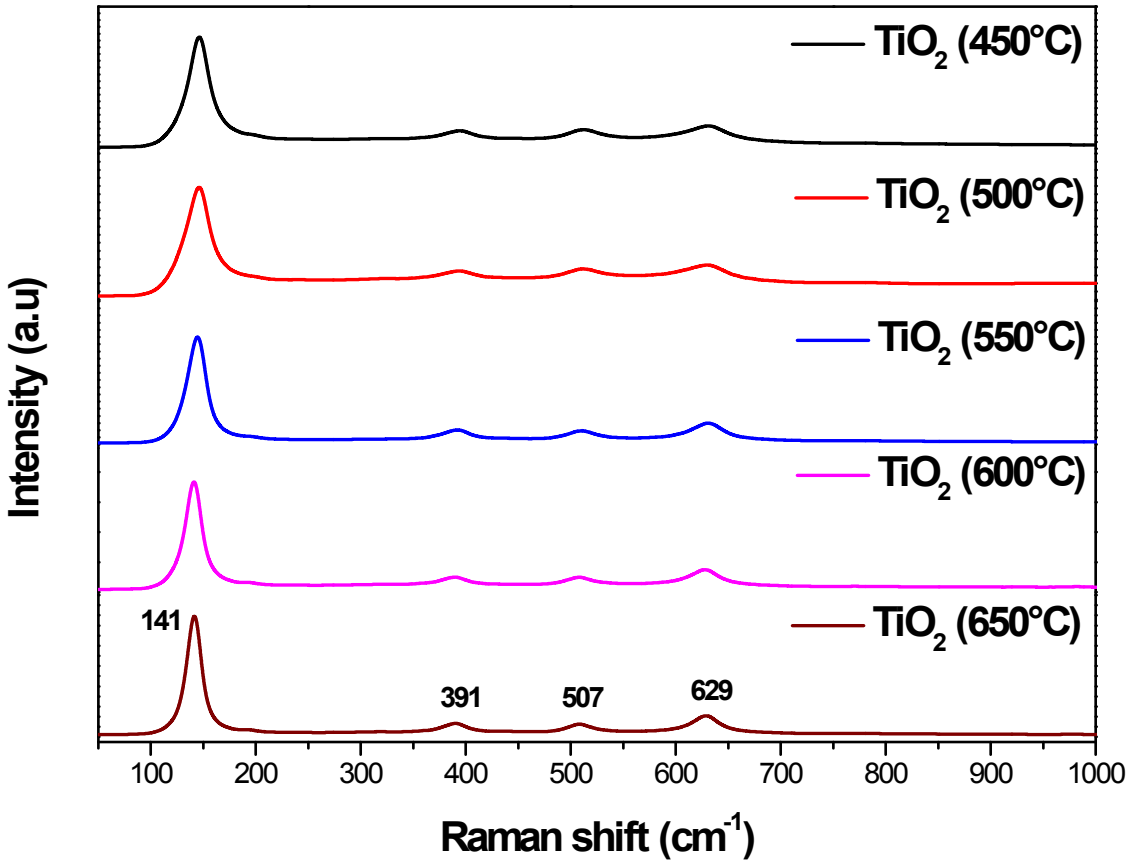

Figure S4. Raman spectra of TiO_2 obtained by calcination of photo-cured TAP-0.5 thin films at various temperatures.

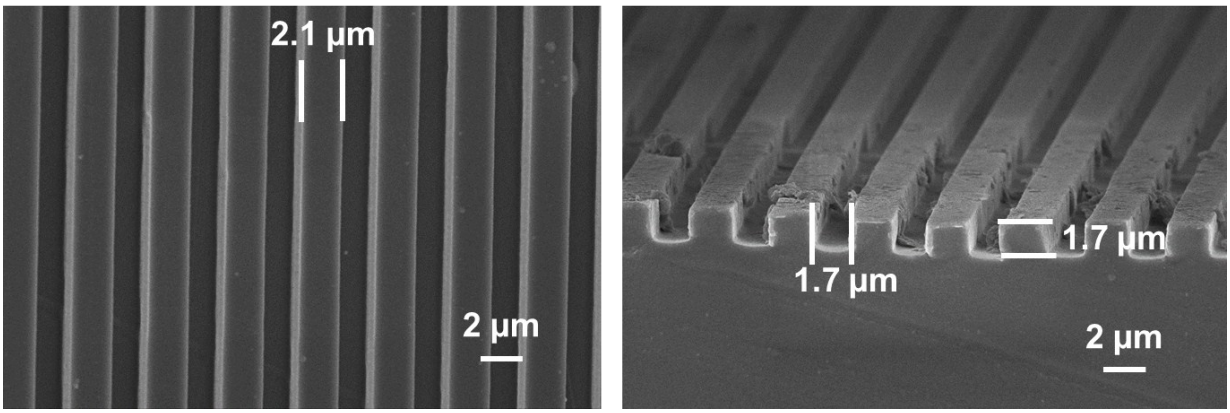

Figure S5. Arial and cross-sectional views of the PDMS mold used in this study.

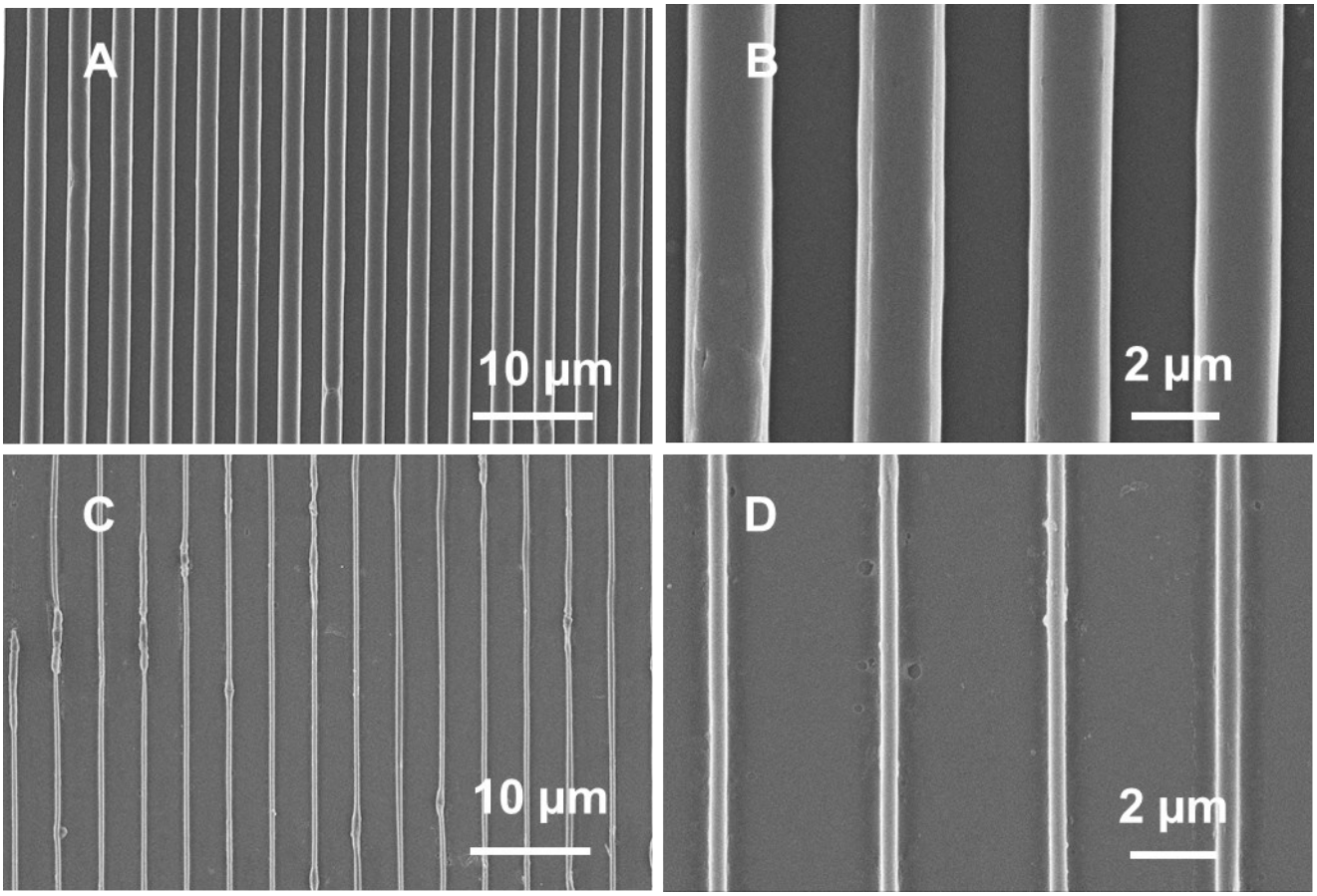

Figure S6. FE-SEM images of imprinted lines of $Ti(MAEAA)_4$-based resin (A and B) before and (C and D) after calcination.

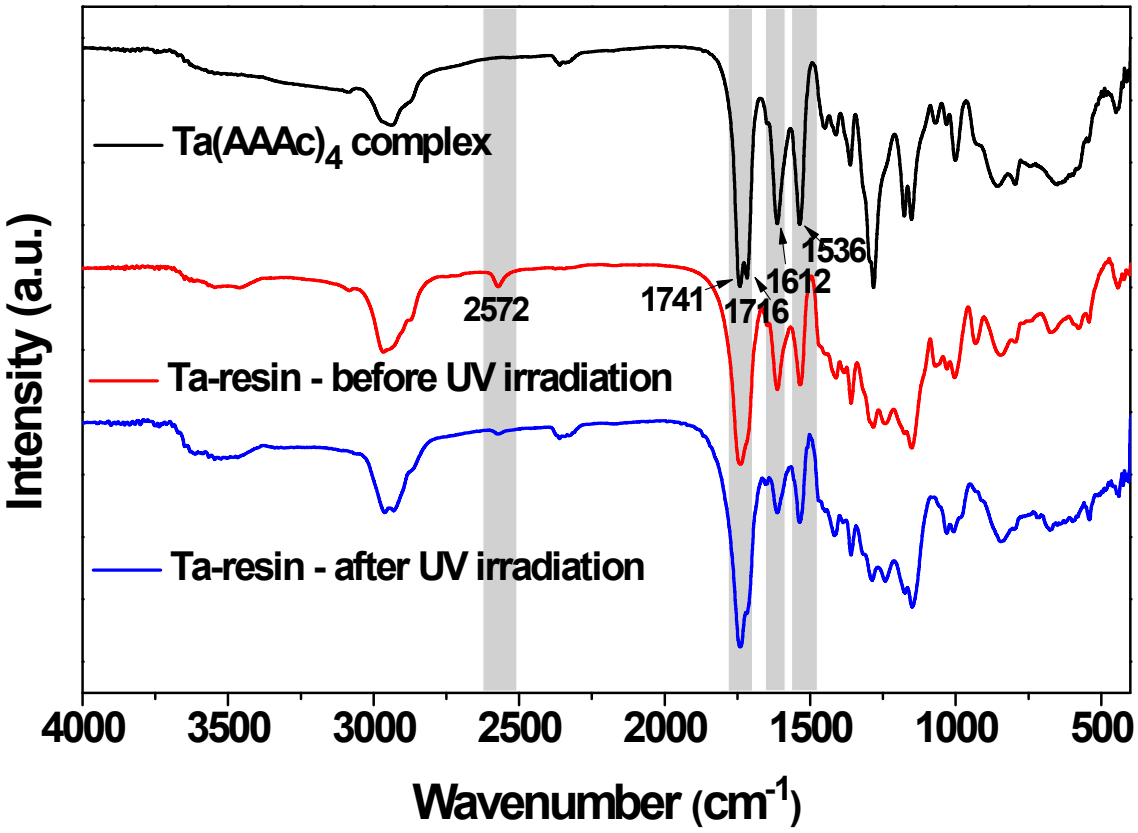

Figure S7. FT-IR analysis of $Ta(AAAc)_4$ complex, and tantalum-containing resin before and after UV irradiation to probe the thiol-ene click reaction.