Elaboration of antibacterial polyurethanes for medical devices by a scalable process

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Thermogravimetric analysis (TGA)

Thermogravimetric analyses were performed using a PerkinElmer 8000 instrument with a temperature ramp from 40 to 800 °C at a heating rate of 10 °C.min^{-1} under a nitrogen atmosphere with a flow rate of 20 mL min^{-1}.

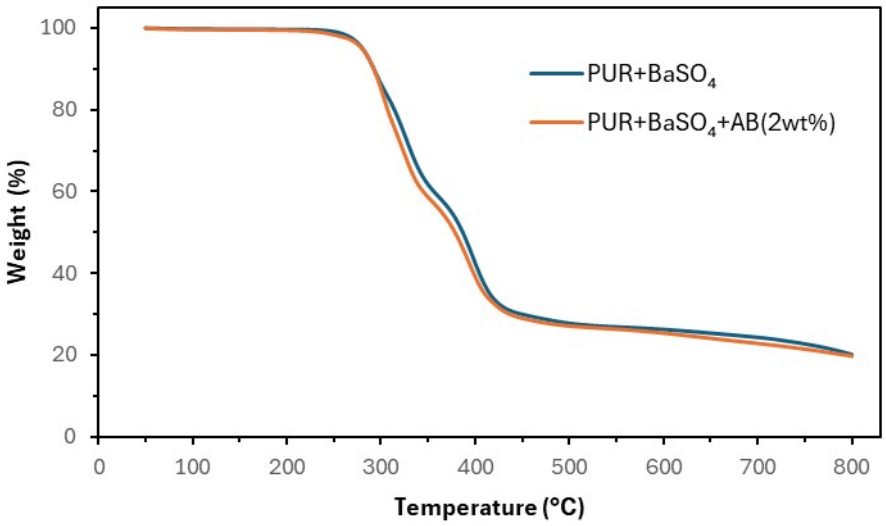

Figure S1. Percentage of mass loss as a function of temperature measured by TGA for the PU (with $BaSO_4$) with 2wt% of the antibacterial (AB) PBMA-*b*-PQDMAEMA copolymer (orange curve) and without AB copolymer (blue curve).

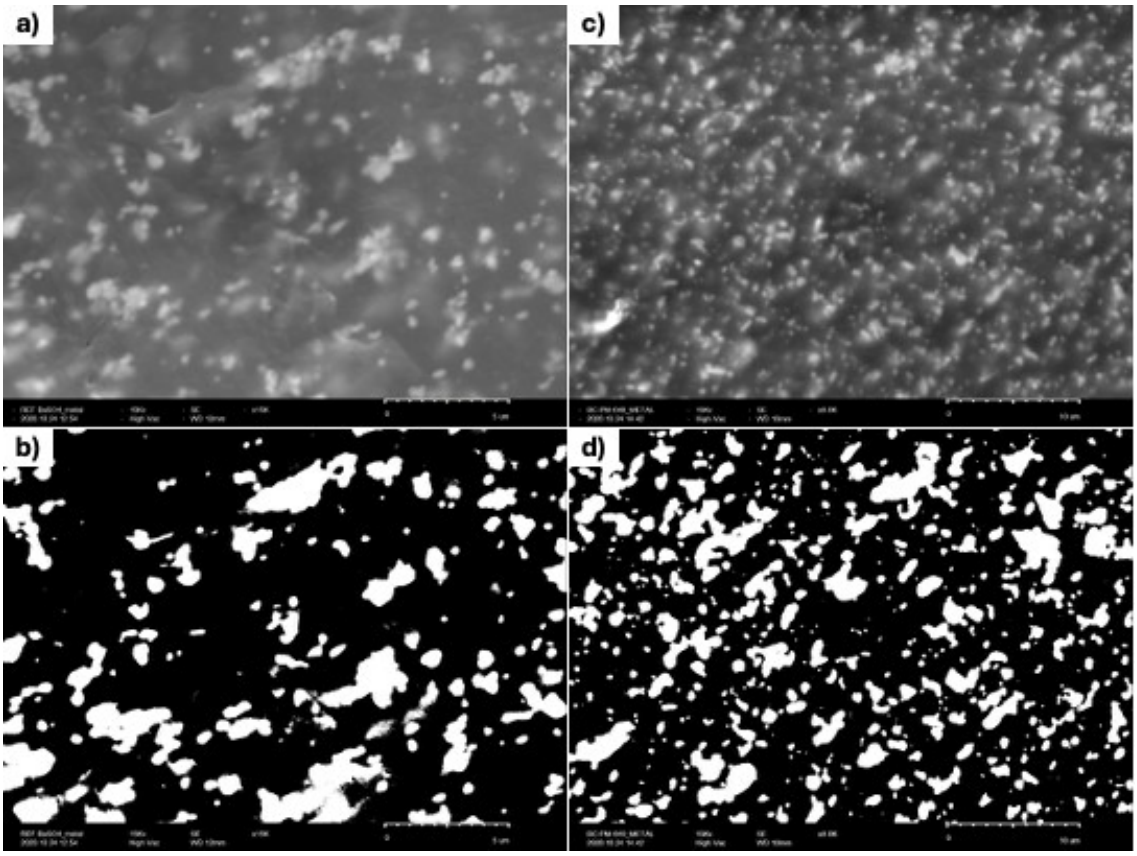

Figure S2. SEM images of PU material surfaces: a) metallized reference PU containing 20 wt% $BaSO_4$ observed by SEM at 8K magnification and b) processing of this image using ImageJ, c) antibacterial PU containing 20 wt% $BaSO_4$ and 2 wt% antibacterial copolymer metallized observed by SEM at 8K magnification and d) processing of this image using ImageJ. Each analysis is performed at 15 kV and under high vacuum. The high-contrast areas correspond to the $BaSO_4$ content (19.58 % and 22.49 %, respectively). a) and b) 5 µm and c) and d) 10 µm.

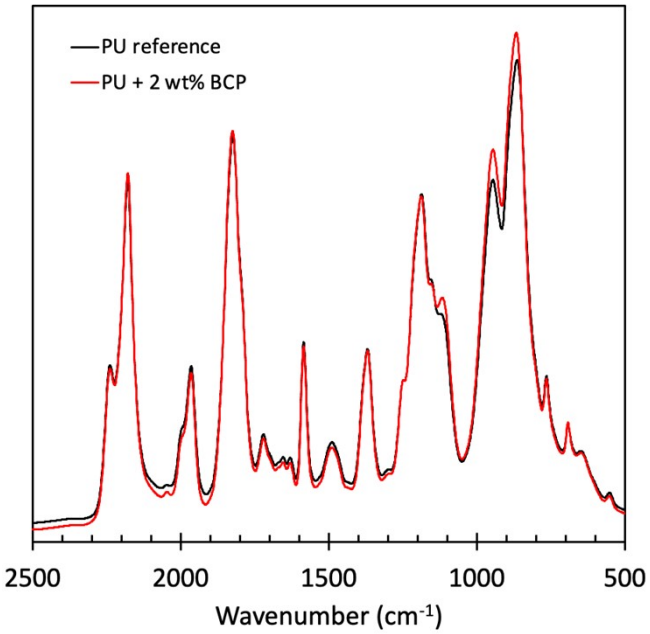

Figure S3. ATR analyses (Diamond crystal) of PU without (black) and with 2 wt% of antibacterial copolymer (red).

Grazing-incidence and transmission SAXS measurements

Transmission-mode SAXS measurements were performed with a five-minute exposure time to characterize bulk morphology. Small-angle X-ray scattering (SAXS) measurements were performed using a custom-built, high-brilliance laboratory beamline at the BioPACIFIC Materials Innovation Platform, UC Santa Barbara. Grazing-incidence SAXS (GI-SAXS) measurements were performed at an incident angle of 0.2°, near the critical angle for total external reflection, which limits the X-ray penetration depth to the top surface. GI-SAXS data were collected with 30-minute exposures, enabling detailed analysis of near-surface nanostructures and anisotropic features.

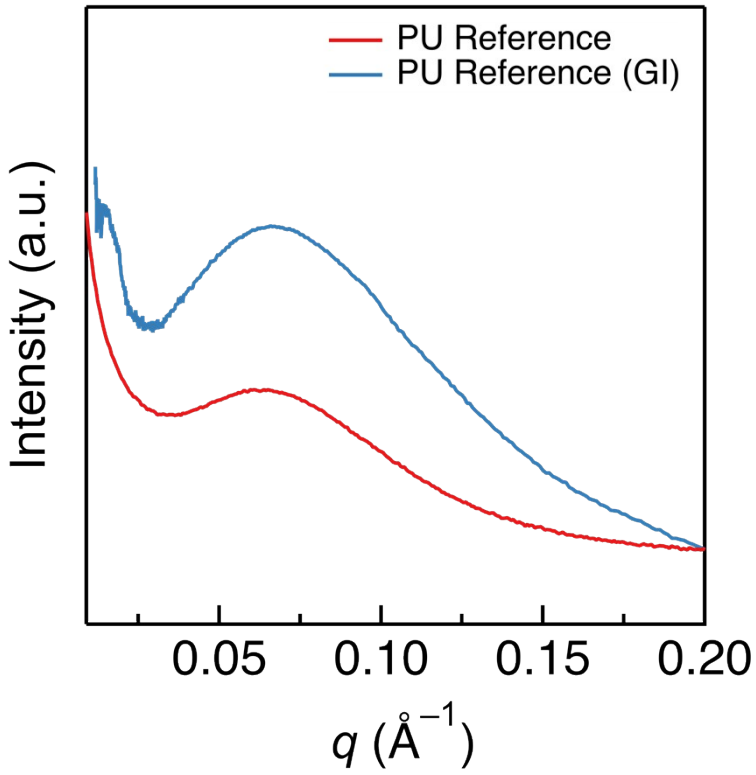

Figure S4. PU analyzed by GI-SAXS (blue) and SAXS in transmission mode (red).

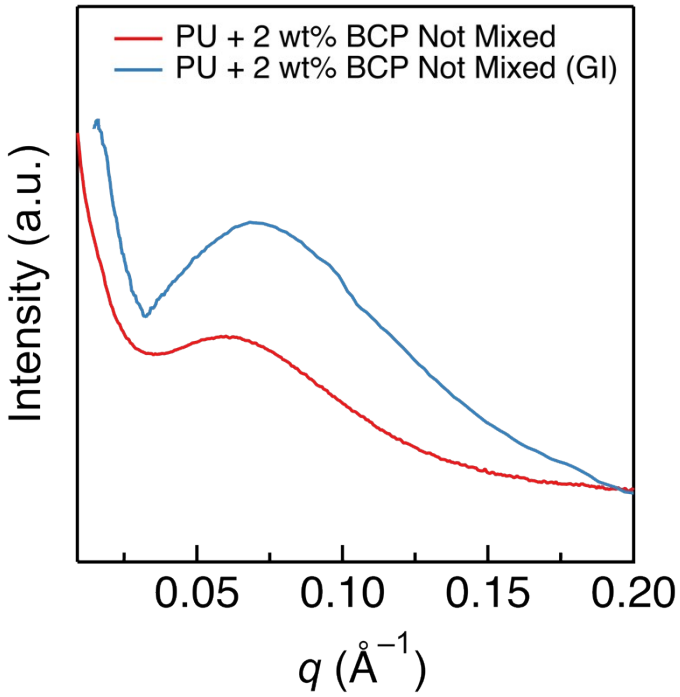

Figure S5. PU + 2wt% of AB copolymer (noted BCP) without pre-compounding analyzed by GI-SAXS (blue) and SAXS in transmission mode (red).

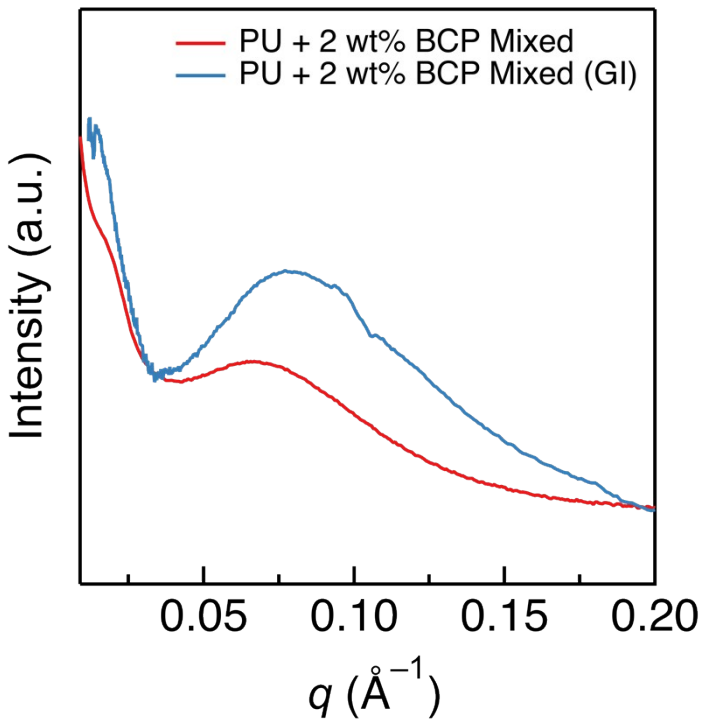

Figure S6. PU + 2wt% of AB copolymer (noted BCP) with pre-compounding analyzed by GI-SAXS (blue) and SAXS in transmission mode (red).