

Supporting information

The effect of weathering environments on microplastic chemical identification with Raman and IR spectroscopy: Part II. Polystyrene, Polyethylene terephthalate, and Nylon 6

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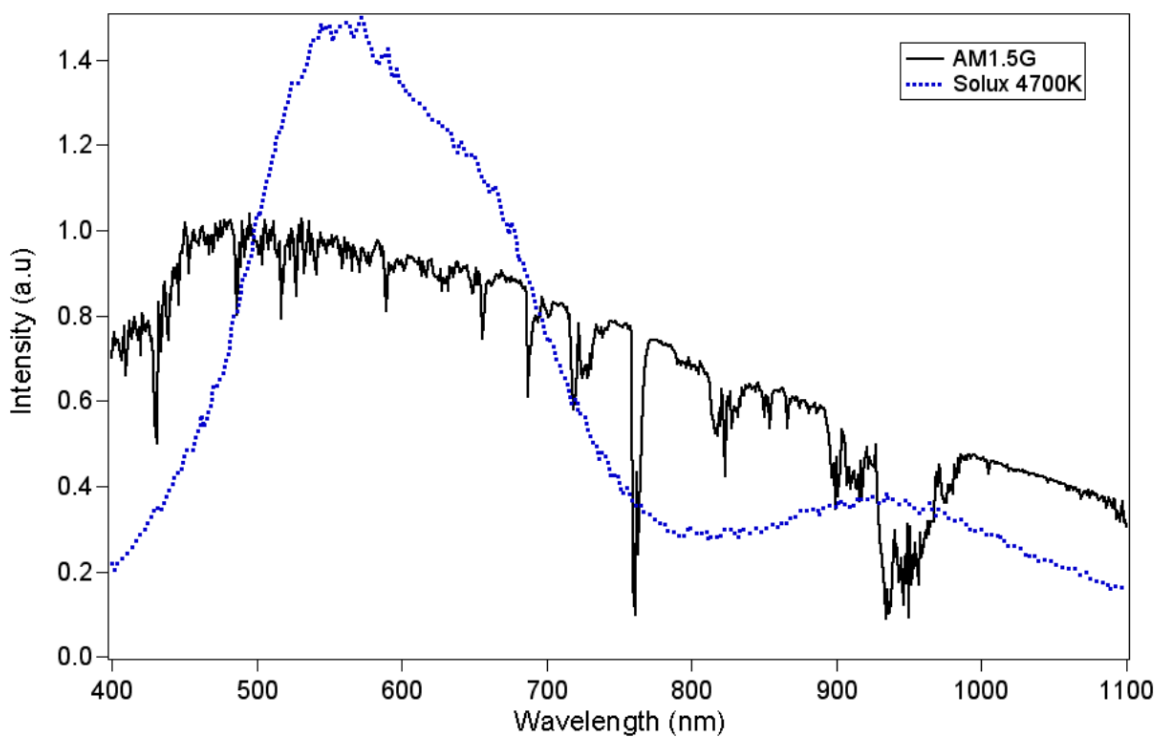


Figure S1. Spectrum of the Solux tungsten halogen lamp for illumination conditions (dotted blue) relative to AM1.5G (solid black). Reprinted with permission from *Adv. Funct. Mater.*, 2010, **20**, 3476–3483. Copyright 2010 Wiley-VCH.¹

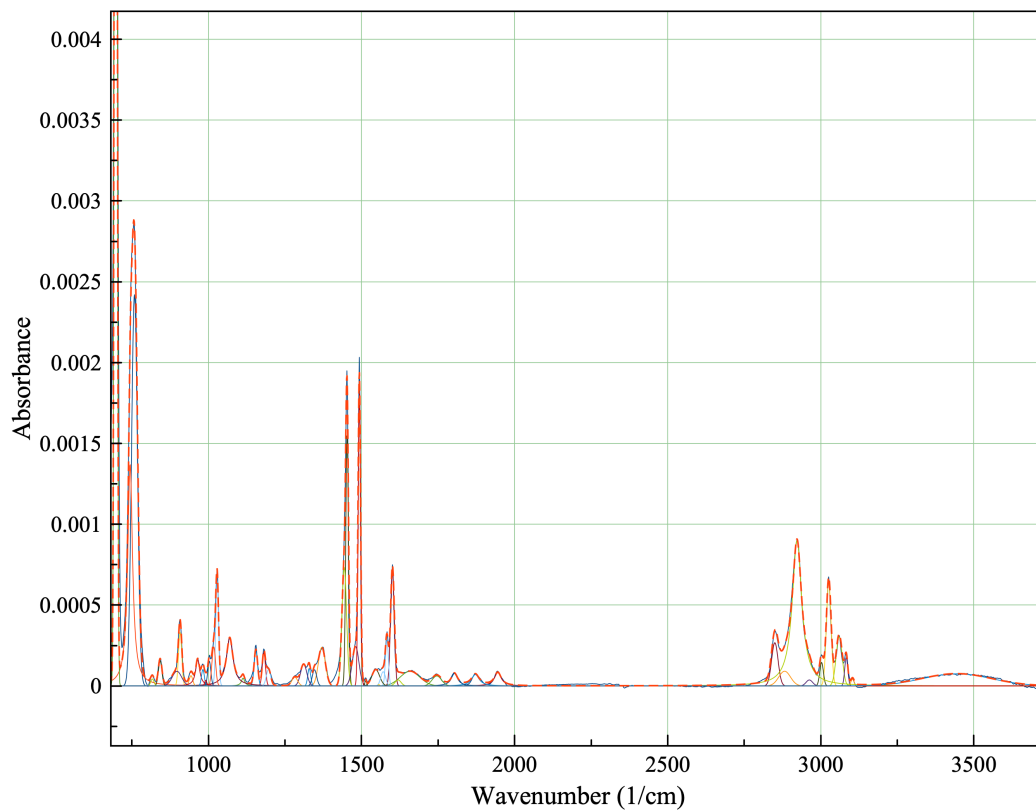


Figure S2. Representative deconvoluted IR spectrum of PS.

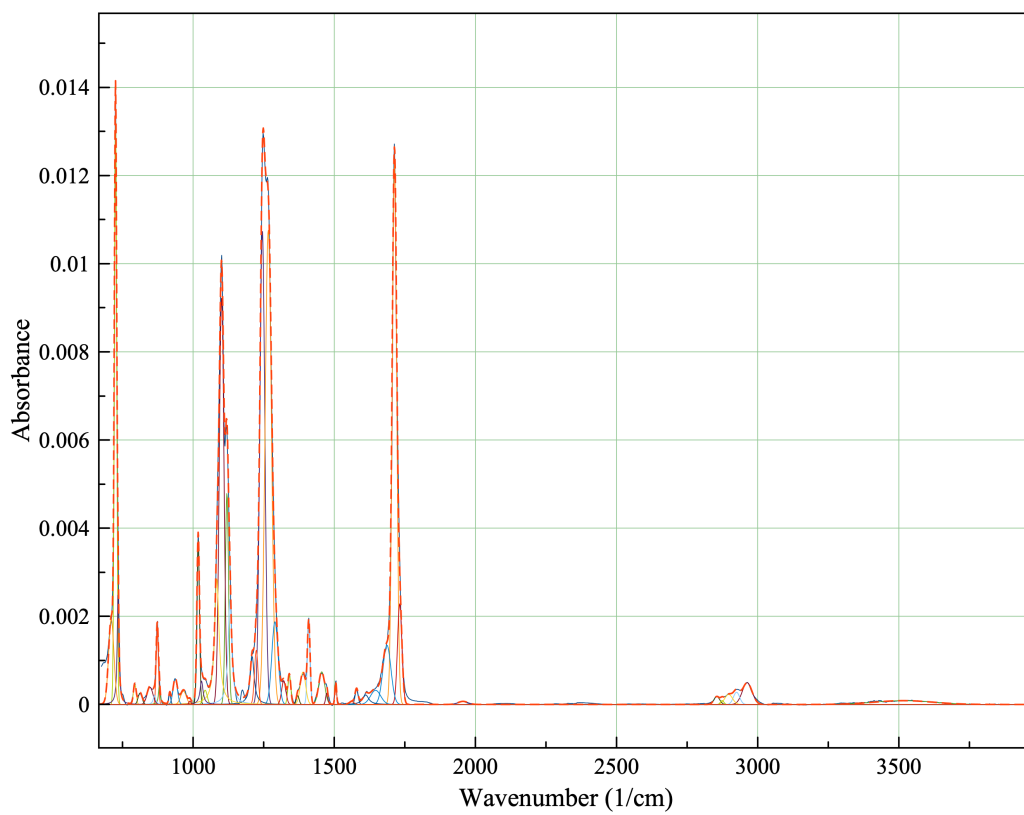


Figure S3. Representative deconvoluted IR spectrum of PET.

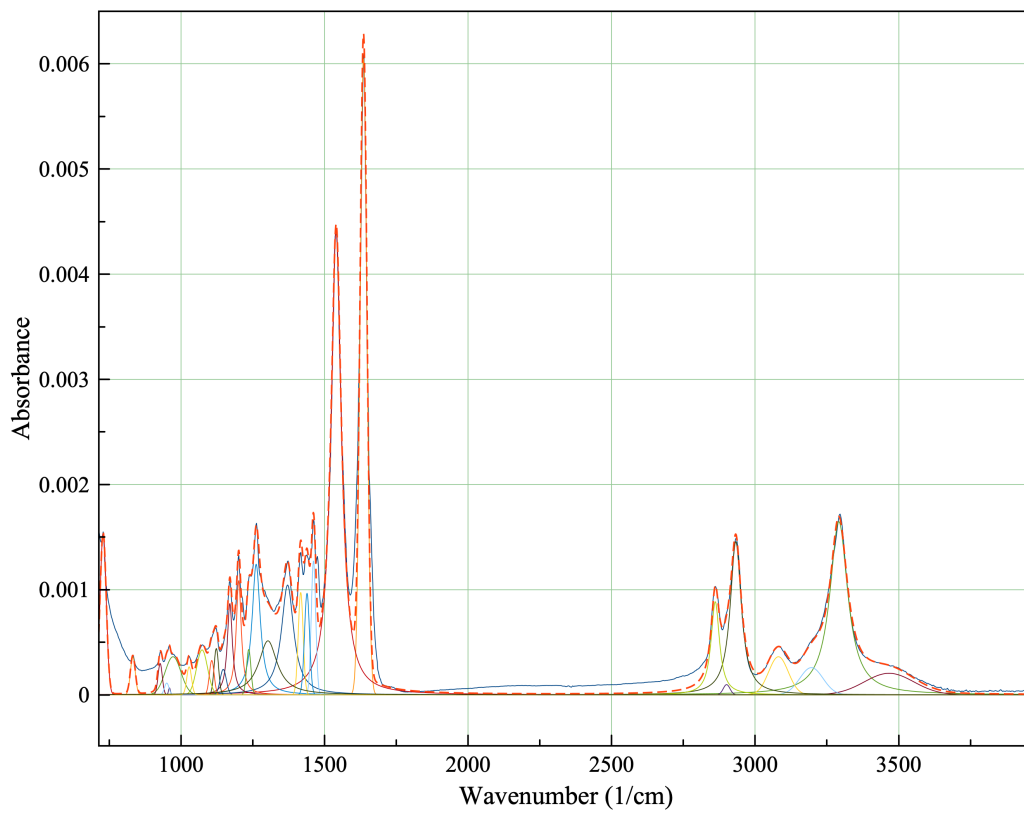


Figure S4. Representative deconvoluted IR spectrum of PA6.

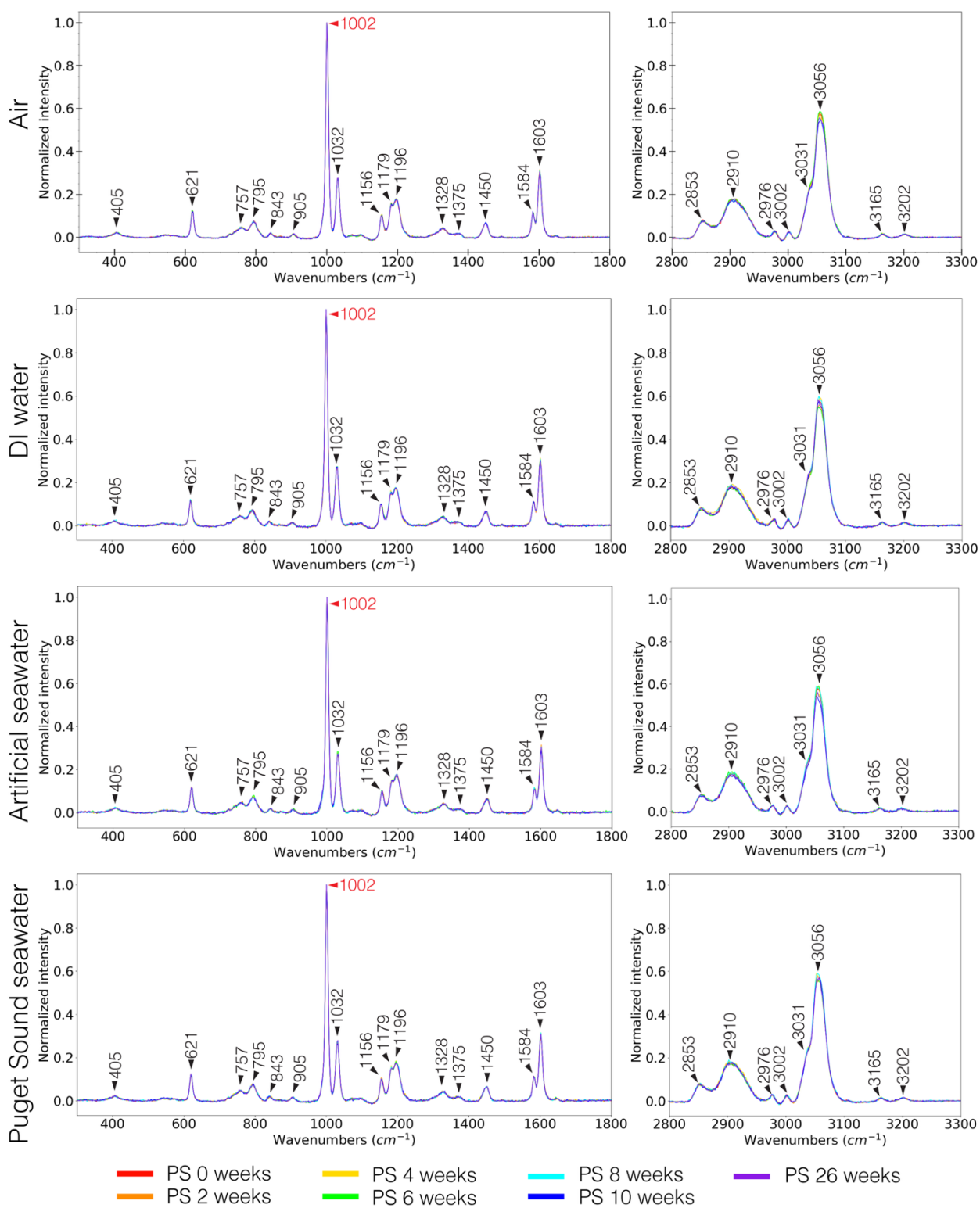


Figure S6 Raman spectra collected with a 532 nm laser of PS in different weathering conditions (Air, DI water, Artificial seawater, and Puget Sound seawater). The red peak at 1002 cm^{-1} was used in PS normalization.

Table S1. Selected Raman peaks and associated vibrational modes of PS²

| Peak position (cm ⁻¹) | Vibrational mode |
|-----------------------------------|------------------------------------|
| 3060 | Aromatic CH stretch |
| 2910 | Asymmetric CH ₂ stretch |
| 1603 | Ring skeleton stretch |
| 1584 | C=C stretch |
| 1450 | CH ₂ bend |
| 1032 | C-H in-plane deformation |
| 1002 | Aromatic ring C-C stretch |

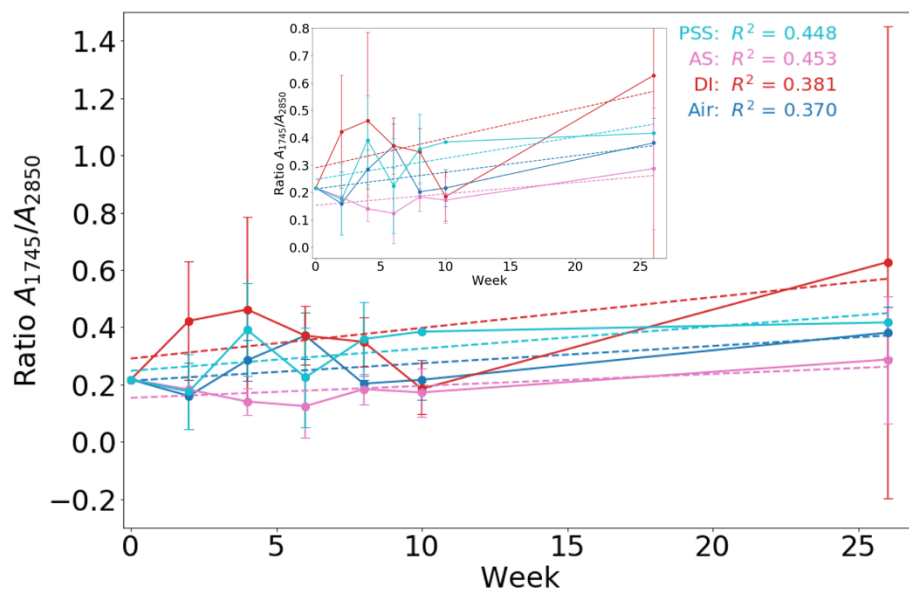


Figure S7 Carbonyl index of PS over time.

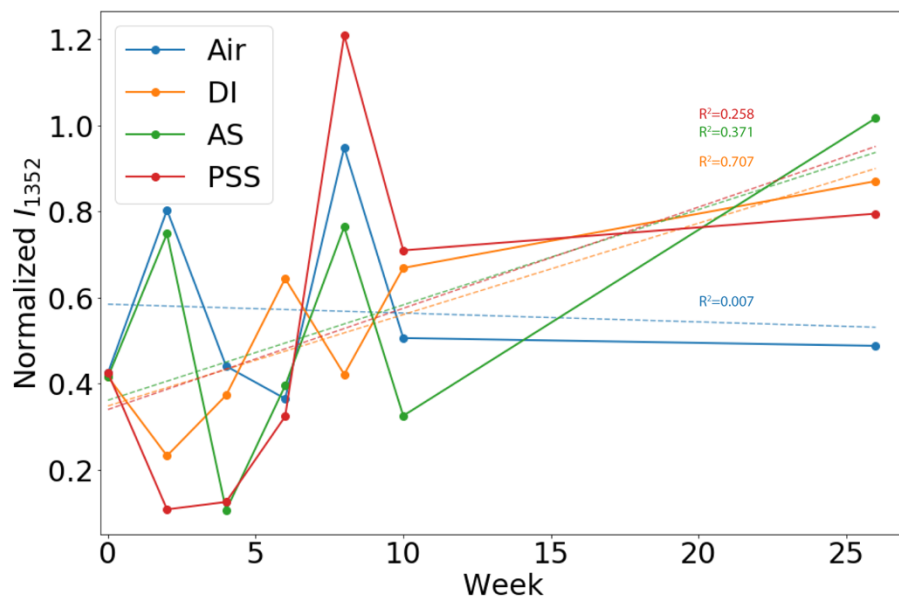


Figure S8 Normalized PET Raman Intensity at 1352 cm⁻¹ peak over time.

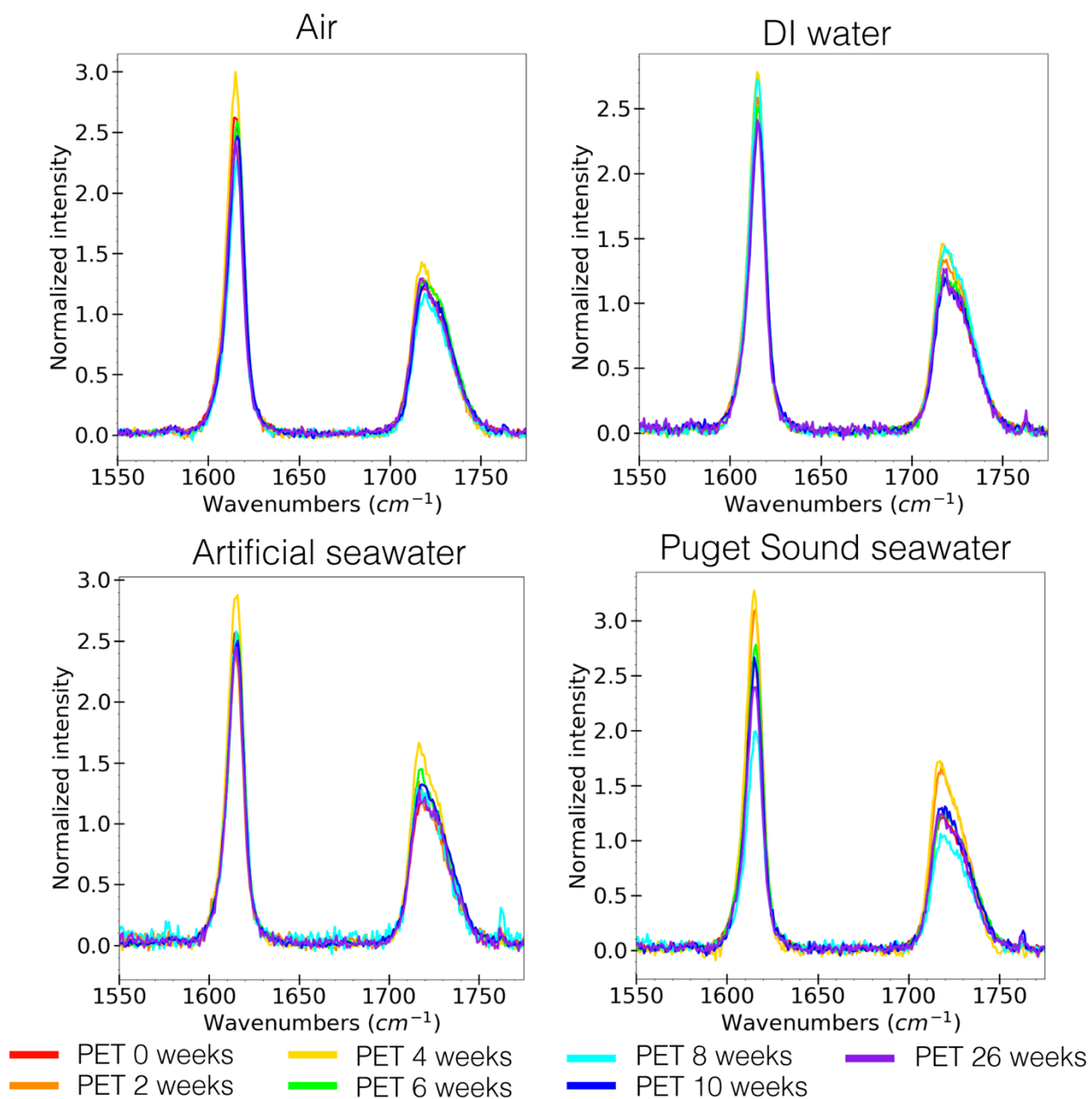


Figure S9 Raman 1615 cm^{-1} and 1725 cm^{-1} peaks of PET in different weathering conditions (Air, DI water, Artificial seawater, and Puget Sound seawater) over time.

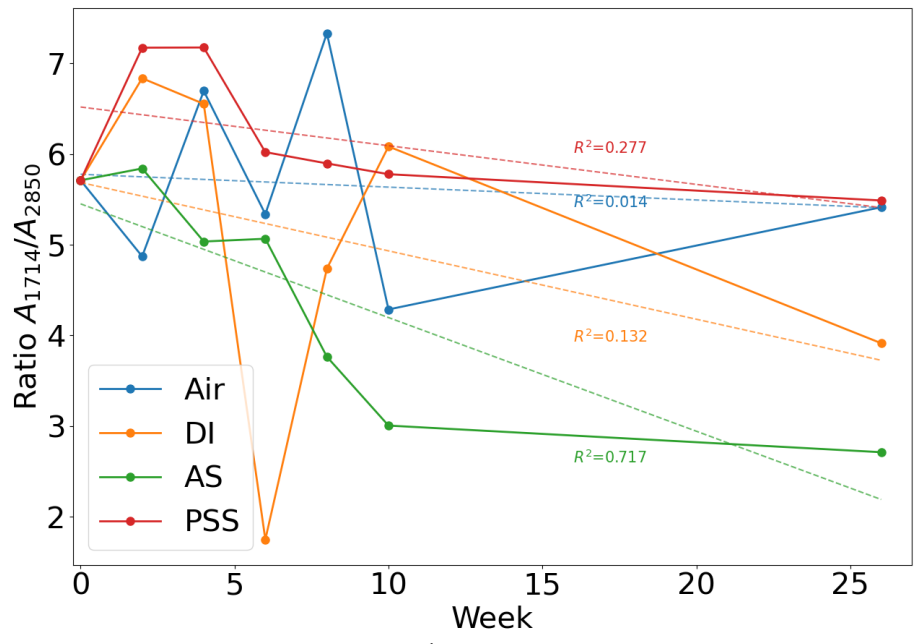


Figure S10 PET IR absorbance at 1714 cm⁻¹ peak over time

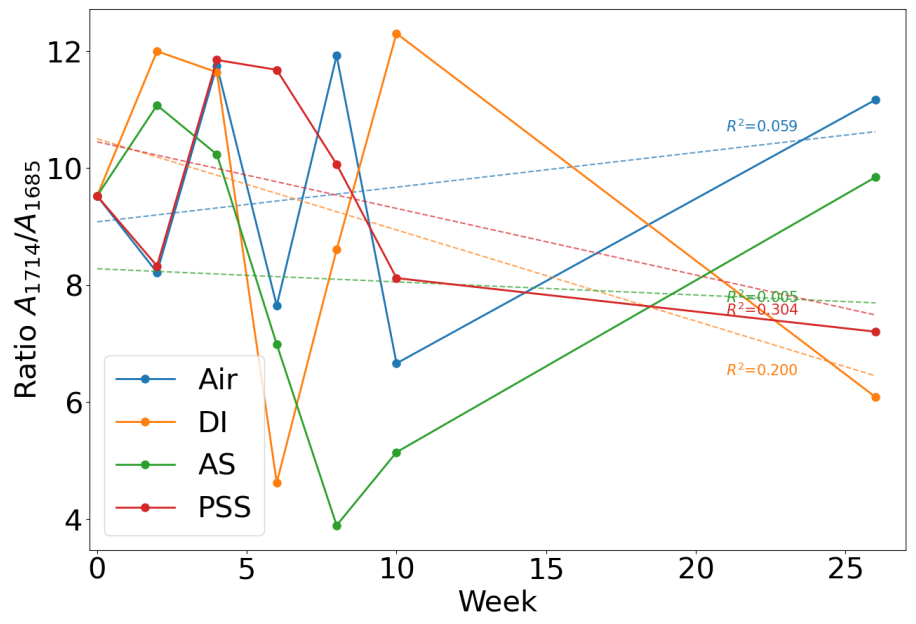


Figure S11 Carbonyl index of PET over time.

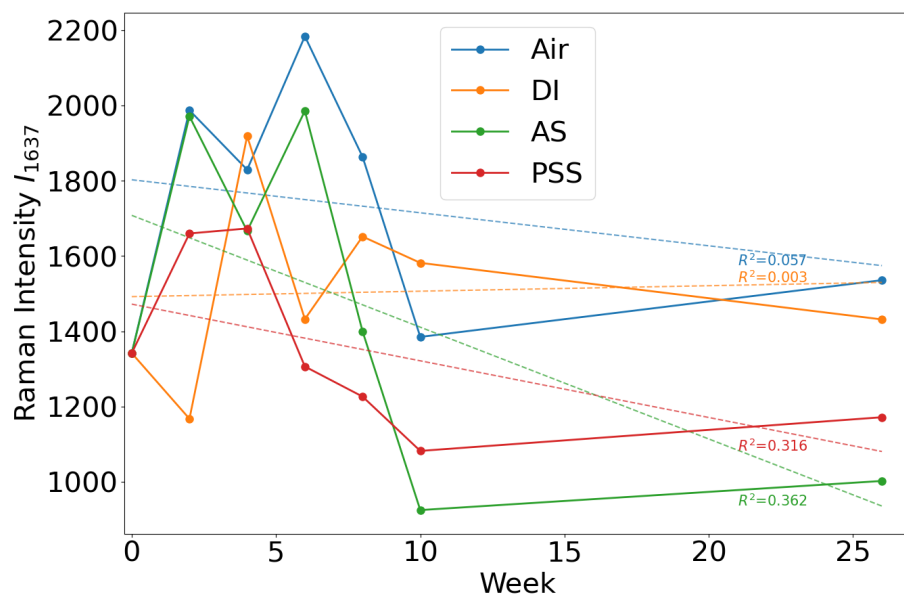


Figure S12 PA6 Raman intensity at 1637 cm^{-1} (C=O stretch) over time.

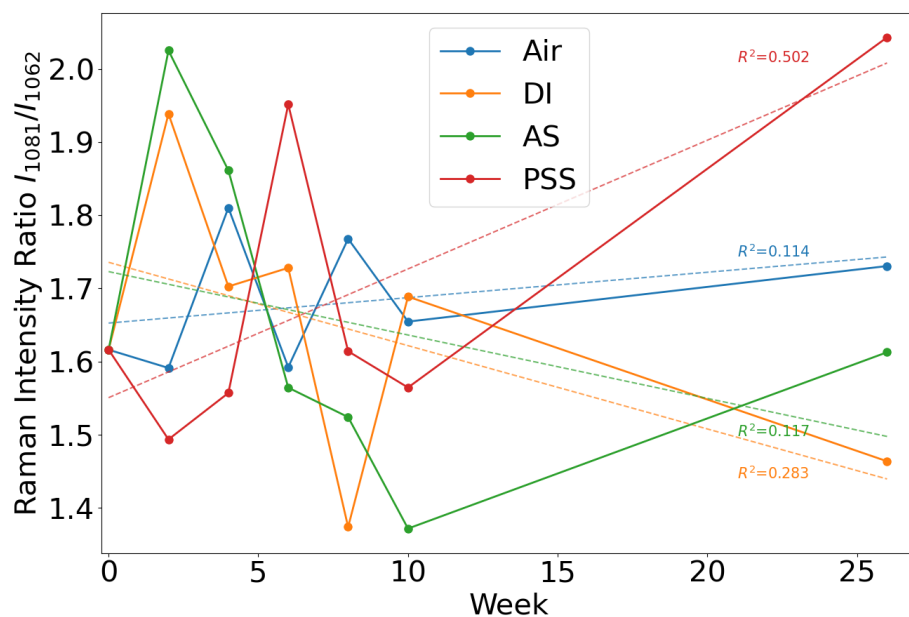


Figure S13 PA6 Raman intensity ratio of 1081 cm^{-1} and $\sim 1062 \text{ cm}^{-1}$ over time.

References

1. M. O. Reese, A. M. Nardes, B. L. Rupert, R. E. Larsen, D. C. Olson, M. T. Lloyd, S. E. Shaheen, D. S. Ginley, G. Rumbles and N. Kopidakis, Photoinduced Degradation of Polymer and Polymer–Fullerene Active Layers: Experiment and Theory, *Adv. Funct. Mater.*, 2010, 20, 3476–3483.

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