**Supporting Information:**

# Chemical Treatment of Poly(lactic acid) Fibers to Enhance Thermal Depolymerization

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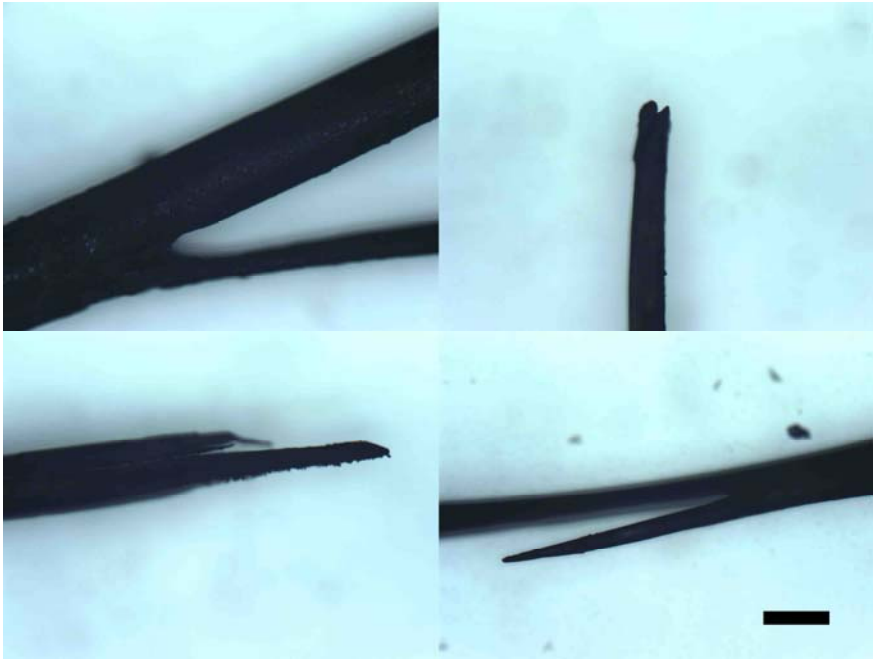

FIGURE S1. Optical image showing the deterioration of PLA fiber (500 μm) after treatment with SrO (Scale bar: 250 μm).

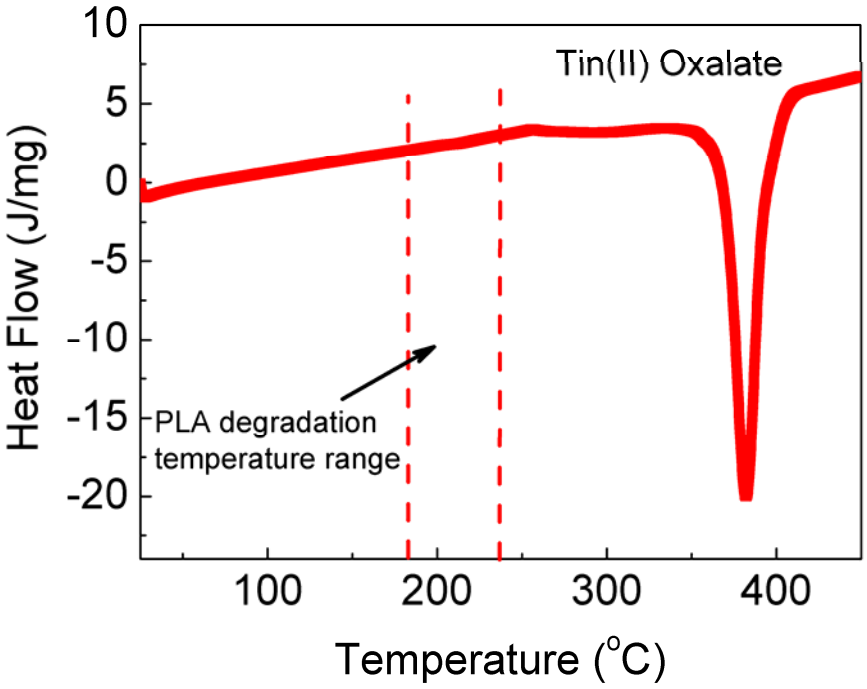


FIGURE S2. DSC curve for tin(II) oxalate showing its thermal stability up to PLA depolymerization temperature range (180 °C–240 °C).

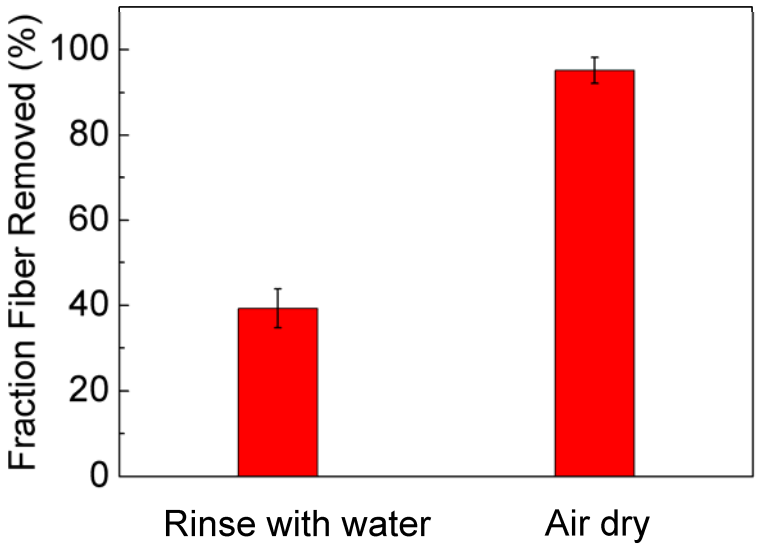


FIGURE S3. Fiber removal fraction data using different post-exposure treatments (fiber diameter: 500 µm, solvent composition: 60 % TFE, tin(II) oxalate concentration: 2 wt%, soak time: 12 h, thermal treatment temperature: 200 °C, thermal treatment time: 2 h).

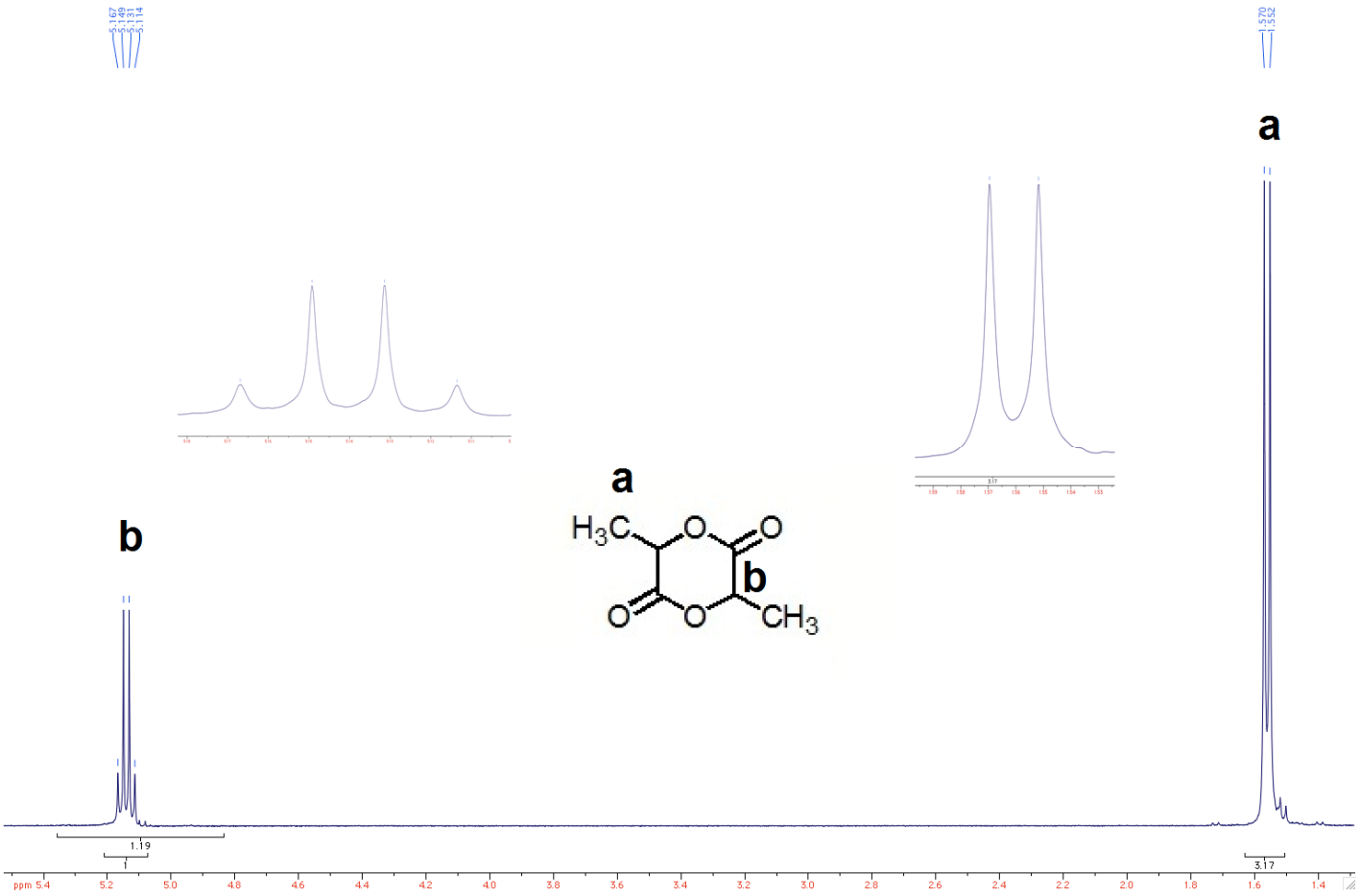


FIGURE S4. $^{1}$H NMR (Solvent: $CDCl_3$) spectrum and splitting patterns for product of tin(II) oxalate treated PLA fiber (500 μm ) heated at 240 $^{o}$C for 4 h (Cropped to show the alkyl region only).

**Degradation Mechanism Study**

Using the approach developed by Murray et al, the number average chain length ( $N$ ) of a polymer during the course of random chain scission is given by

$$N_t = \frac{N_0}{B+1} \quad (1)$$

where $N_0$ is the initial number average chain length and $N_t$ is the number after an average of $B$ bonds have been broken per original molecule. The degree of degradation, $\alpha$ , is defined by $\alpha = \frac{B}{N_0 - 1}$ which reduced to

$$\alpha = \frac{B}{N_0} \quad (2)$$

for large number of $N_0$.

Assume the chain scission rate (the ester hydrolysis rate) remains constant during the entire degradation process, that is

$$\alpha = kt \quad (3)$$

Combining (1) (2) (3) we get:

$$N_t = \frac{1}{\frac{1}{N_0} + kt}$$

which is the governing equation of $N_t$ as a function of $t$.

Fit the experimental data with the function

$$y = \frac{1}{a + bx}$$

we get:

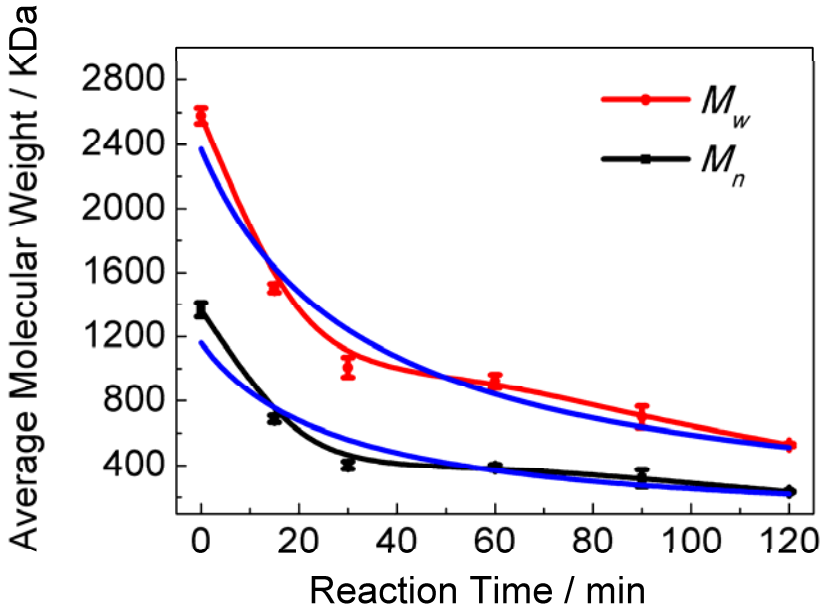


FIGURE S5. Average molecular weight plotted as a function of reaction time and fitting curves (blue) assuming a chain random scission model.