

# Electric Volume Resistivity for Biopolyimide Using 4,4'-Diamino- $\alpha$ -truxillic Acid and 1,2,3,4-Cyclobutanetetracarboxylic Dianhydride

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## Materials.

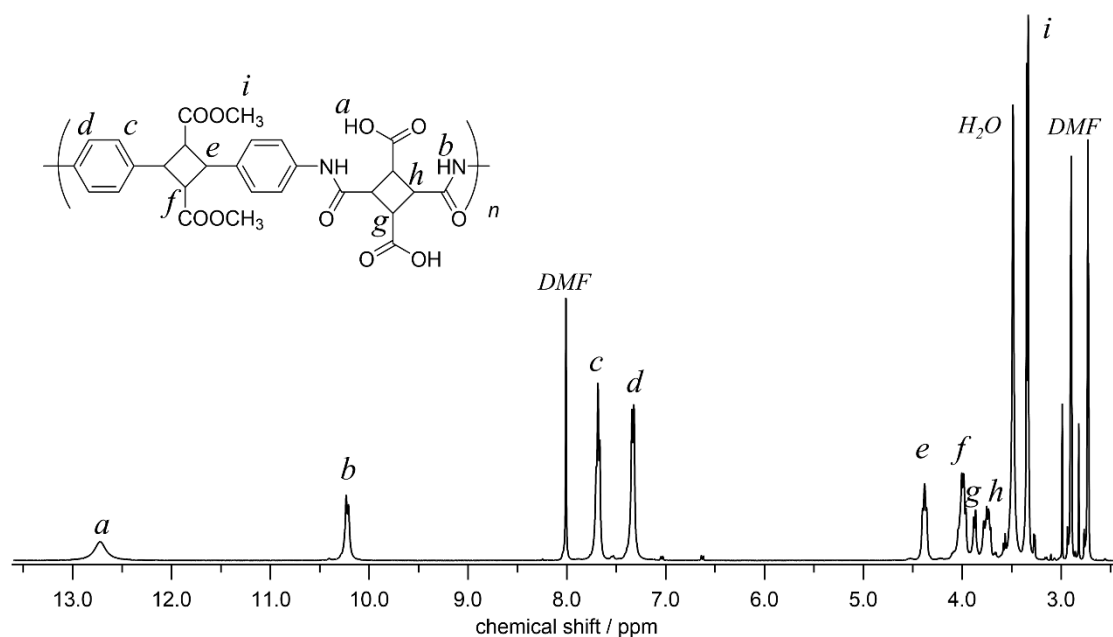
4-Aminocinnamic acid (4ACA) and 1,2,3,4-cyclobutanetetracarboxylic dianhydride (CBDA) were purchased from Tokyo Chemical Industry Co., LTD. *N,N*-Dimethylacetamide were purchased from FUJIFILM Wako Pure Chemical Corporation. Trimethylsilyl chloride (TMS) was purchased from Sigma-Aldrich Co. LLC. CBDA was sublimated by heating (150°C) in *vacuo*. 4,4'-diamino- $\alpha$ -truxillic acid dimethyl ester was synthesized based on previous research. [1]. All other chemicals were directly used as purchased.

## Instruments.

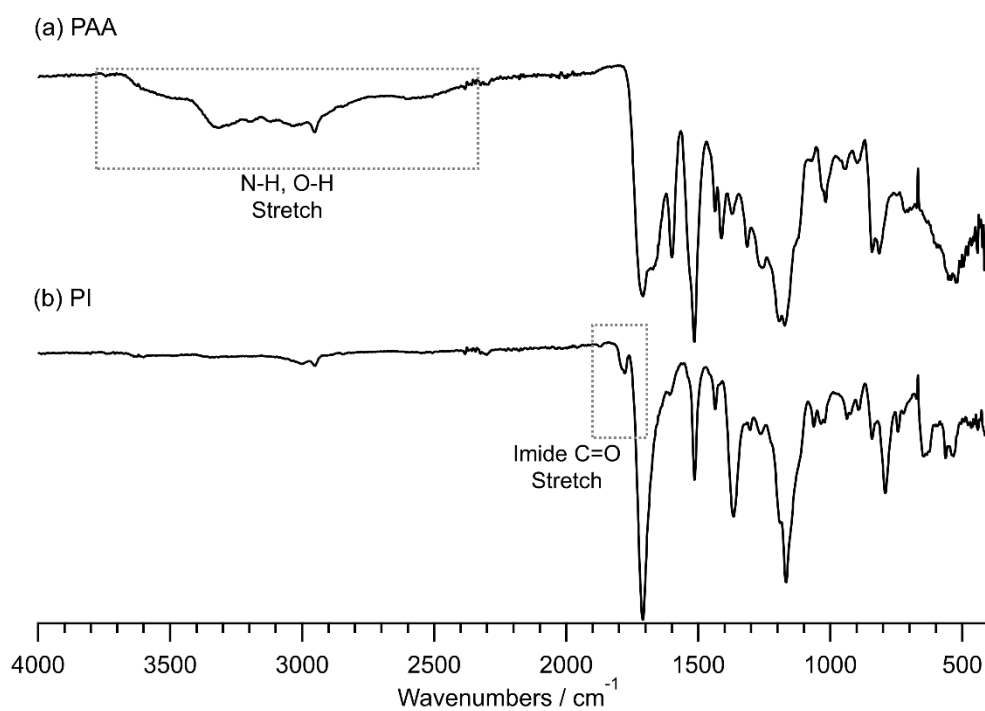
Proton ( $^1\text{H}$ ) nuclear magnetic resonance (NMR) and carbon- $^{13}$  ( $^{13}\text{C}$ ) NMR measurements were carried out using Bruker Bio-spin AG 400 MHz and 100 MHz, respectively. Fourier Transform Infrared Spectroscopy (FT-IR) measurement were recorded with a Perkin-Elmer Spectrum One spectrometer between 4000 and 600  $\text{cm}^{-1}$  using a diamond-attenuated total reflection (ATR) accessory.

## Reference.

- [1] Suvannasara, P.; Tateyama, S.; Miyasato, A.; Matsumura, K.; Shimoda, T.; Ito, T.; Yamagata, Y.; Fujita, T.; Takaya, N.; Kaneko, T. "Bio-based polyimides from 4-aminocinnamic acid photodimer" *Macromolecules* **2014**, *47*, 1586-1593. DOI: 10.1021/ma402499m



**Figure S1.** <sup>1</sup>H NMR spectrum of poly(amic acid) which made from 4,4'-diamino- $\alpha$ -truxillic acid dimethyl ester (ATA) and 1,2,3,4-cyclobutanetetracarboxylic dianhydride (CBDA) (400 MHz; solvent, DMF-*d*<sub>7</sub>).



**Figure S2.** FT-IR spectrum of (a) poly(amic acid) and (b) poly(ATA-CBDA), as a biopolyimide.