Advances in the synthesis of bio-based aromatic polyesters: novel copolymers derived from vanillic acid and ε-caprolactone

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Equation S1-S4: Quantitative determination of the molar fractions ($F$) of EV-EV, EV-CL, CL-CL and CL-EV sequences by $^1$H-NMR signals

\[
F_{EV-EV} = \frac{I_f}{I_f + I_f} \quad S1
\]

\[
F_{EV-CL} = \frac{I_f}{I_f + I_f} \quad S2
\]

\[
F_{CL-CL} = \frac{I_i}{I_i + I_i} \quad S3
\]

\[
F_{CL-EV} = \frac{I_i}{I_i + I_i} \quad S4
\]

Equation S5-S8: Quantitative determination of the molar fractions ($F$) of EV-EV, EV-CL, CL-CL and CL-EV sequences by $^{13}$C-NMR signals

\[
F_{EV-EV} = \frac{I_1}{I_1 + I_2} \quad S5
\]

\[
F_{EV-CL} = \frac{I_2}{I_1 + I_2} \quad S6
\]

\[
F_{CL-CL} = \frac{I_3}{I_3 + I_4} \quad S7
\]

\[
F_{CL-EV} = \frac{I_4}{I_3 + I_4} \quad S8
\]

Equation S9-S11: Quantitative determination of the average sequence lengths of EV-EV and CL-CL dyads ($L_{EV-EV}$ and $L_{CL-CL}$) and the randomness degree ($B$)

\[
L_{EV-EV} = \frac{F_{EV-EV}}{F_{EV-CL}} + 1 \quad S9
\]

\[
L_{CL-CL} = \frac{F_{CL-CL}}{F_{CL-EV}} + 1 \quad S10
\]

\[
B = \frac{1}{L_{EV-EV}} + \frac{1}{L_{CL-CL}} \quad S11
\]