

Supporting Information

Achieving very high performance polybenzoxazines from natural renewable isoliquiritigenin: Design, preparation and property investigation

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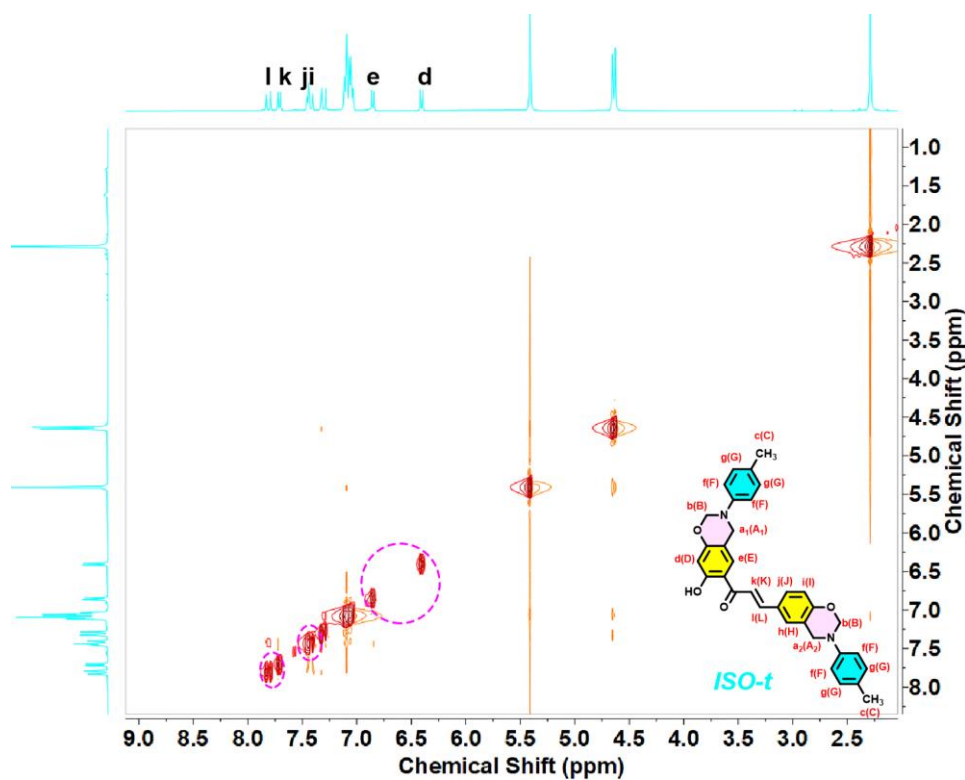


Figure S1. 2D ^1H - ^1H NOESY NMR spectrum of **ISO-t** in CDCl_3 .

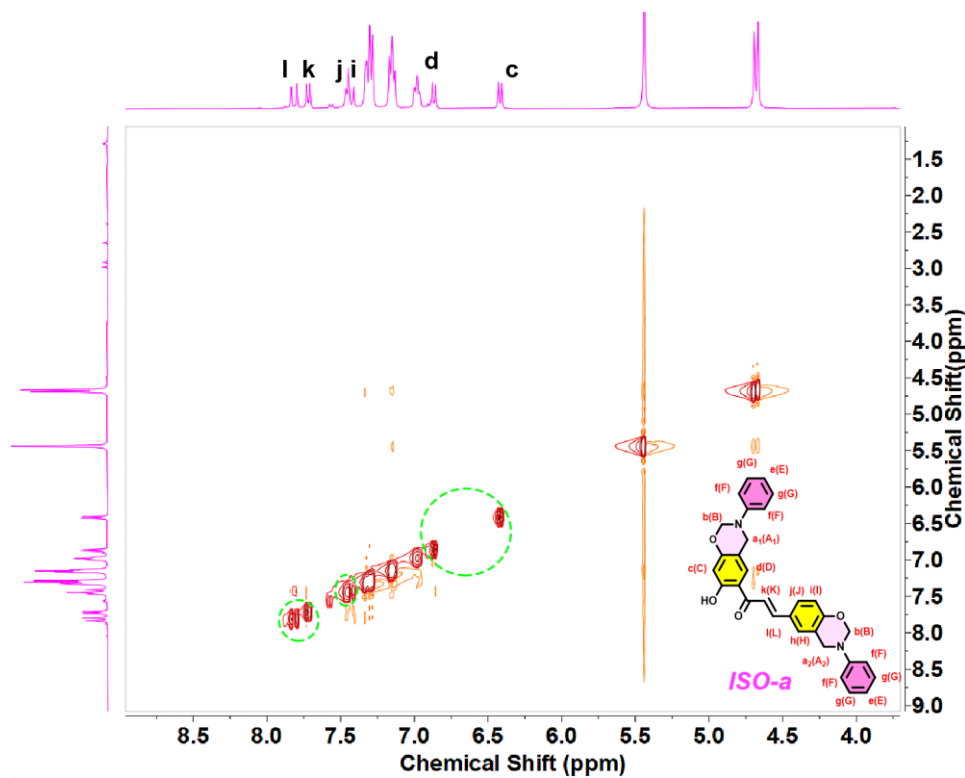


Figure S2. 2D ^1H - ^1H NOESY NMR spectrum of **ISO-a** in CDCl_3 .

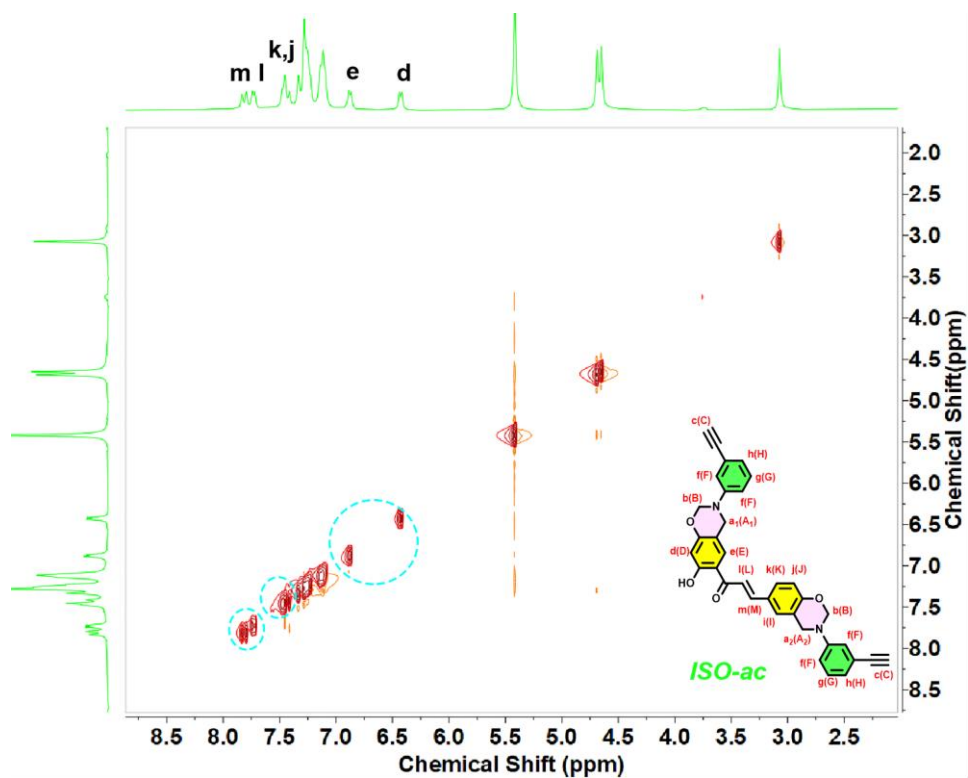


Figure S3. 2D ^1H - ^1H NOESY NMR spectrum of **ISO-ac** in CDCl_3 .

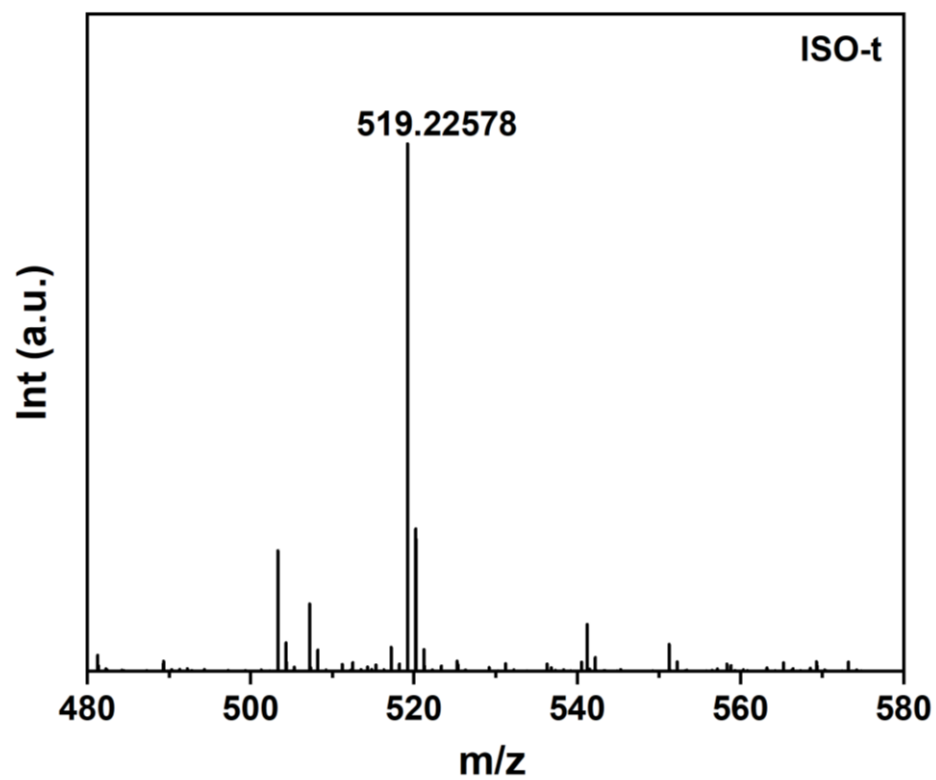


Figure S4. HR-MS spectrum of **ISO-t**.

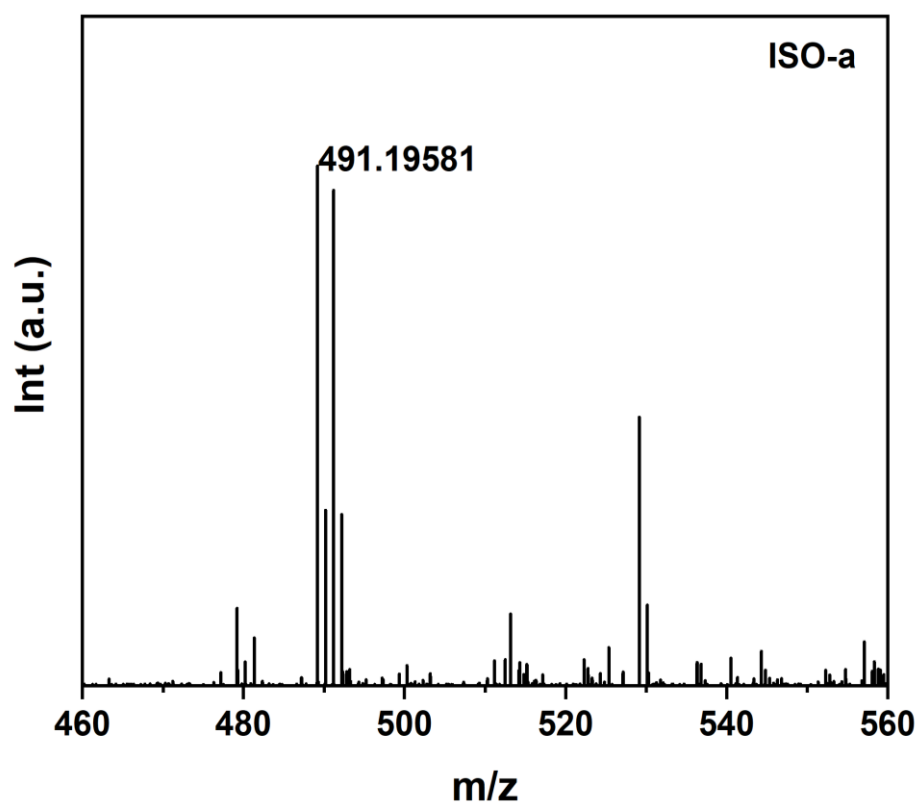


Figure S5. HR-MS spectrum of ISO-a.

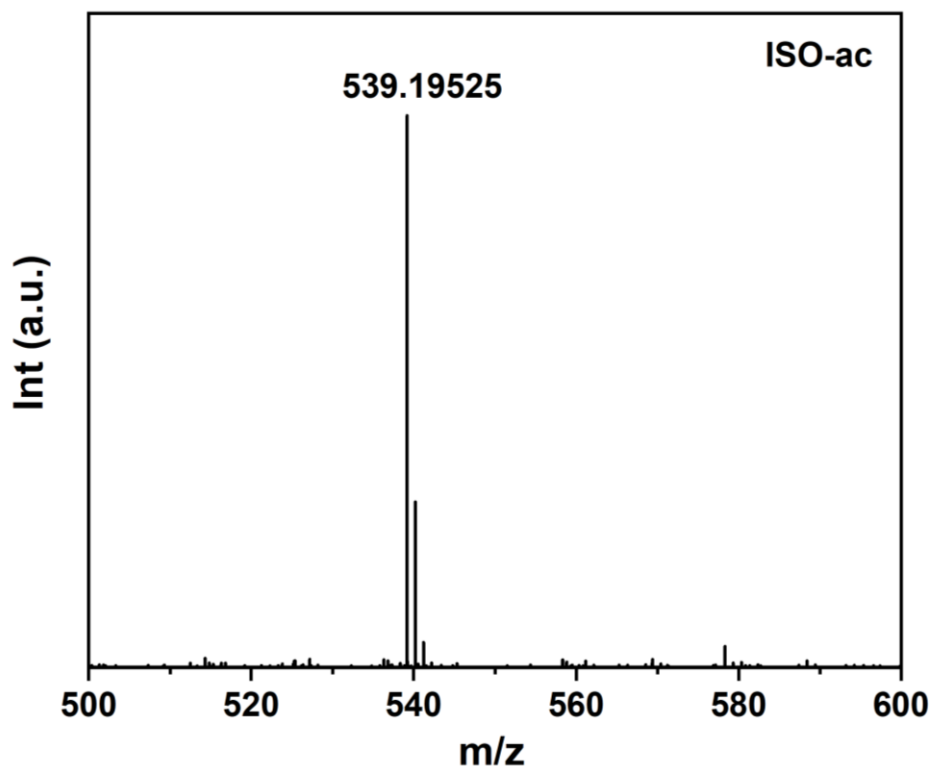


Figure S6. HR-MS spectrum of ISO-ac.

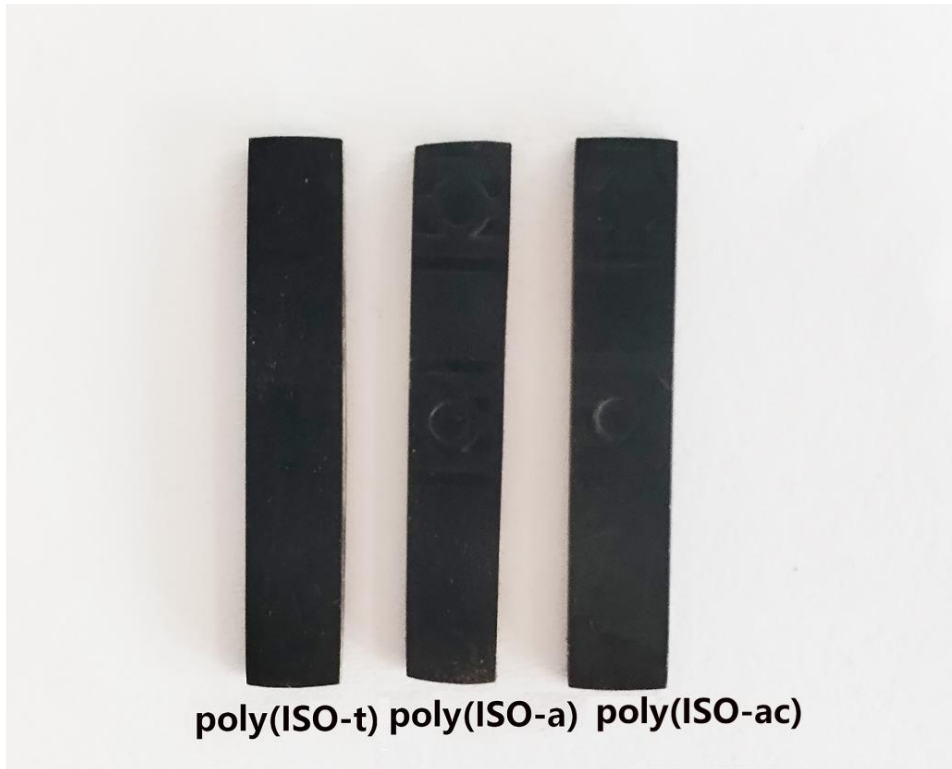


Figure S7. Sample images of Dynamic mechanical analysis.

Swelling tests and calculation of the crosslinking density

The swelling percentage was calculated from the mass changes using the following equation (S1):

$$Swelling(\%) = \frac{W_2 - W_1}{W_1} \times 100 \quad \text{equation (S1)}$$

W_1 and W_2 are the weight (g) of the initial sample and the weight of the sample after immersion, respectively. Then, using the Flory–Rehner equation [Equations (S2)–(S4)] and the results of the swelling test, the cross-linking density can be calculated.

$$M_C = \frac{-\rho_P V_S V_r^{1/3}}{\ln(1 - V_r) + V_r + \chi V_r^2} \quad \text{equation (S2)}$$

$$V_r = \frac{1}{1 + Q_m} \quad \text{equation (S3)}$$

$$V_c = \frac{1}{2M_c} \quad \text{equation (S4)}$$

where M_C is the molecular weight between the crosslinking nodes, ρ_P is the density of the polybenzoxazines (V_S is the molar volume of the solvent (V_S toluene

$=106.8 \text{ cm}^3/\text{mol}$), χ is the interaction coefficient between the polybenzoxazines-solvent, which we took the hypothesis that χ approximated to 0.5, V_r is the volume fraction of the polymer in the swollen specimen, Q_m is the increased weight of polybenzoxazines in toluene, and V_c is the cross-link density.