

Supplementary information

**FDU-12-C Encapsulated t-Bu(*R,R*)Co^{II}(salen) as Cathode Catalysts
for Asymmetric Electrocarboxylation of 1-Phenylethyl Chloride with
CO₂**

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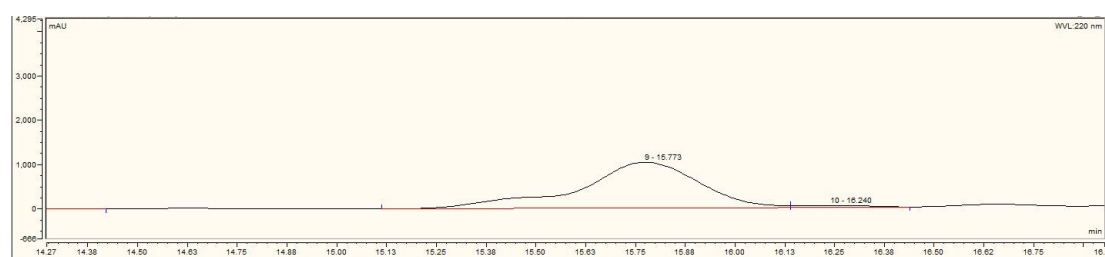
1. Supplementary Methods

The ee value of the product is determined by the peak integral area corresponding to the two configurations of R and S in **Fig. S1**, using the following formula:

$$ee = \frac{|[R] - [S]|}{[R] + [S]} \times 100\%$$

Where [R] and [S] are corresponded to the peak integrated areas of the R and S configuration products from the HPLC chart, respectively.

The yield of the product was calculated from the sum of the areas of the two peaks, ie, [R]+[S], according to the calibration curve.



Configuration of Product	Ret Time (min)	Peak Area (mAU*min)	ee (R-)
R-	15.773	230.343	86%
S-	16.240	16.405	

Figure S1. The raw data of ee value corresponds to entry 5 of Table 1 in the manuscript.

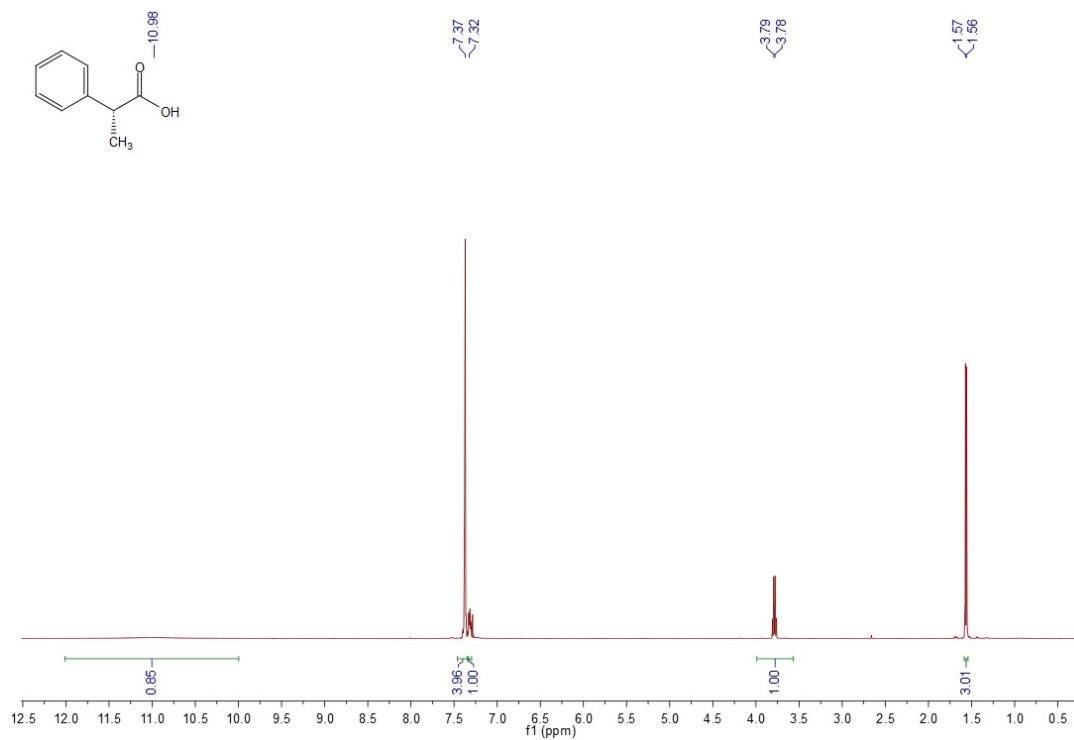


Figure S2. ¹H NMR spectrum of the product.

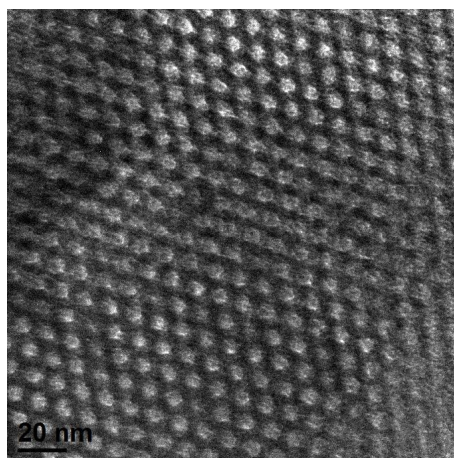


Figure S3. TEM image of t-Bu(*R,R*)Co^{II}(salen)@FDU-12-C(180) after using for 6 times

Table S1 ICP characterization of Co element content

Entry	Sample	Co loaded (wt%)
1	t-Bu(<i>R,R</i>)Co ^{II} (salen)@FDU-12-C(200)	0.16
2	t-Bu(<i>R,R</i>)Co ^{II} (salen)@FDU-12-C(180)	0.16
3	t-Bu(<i>R,R</i>)Co ^{II} (salen)@FDU-12-C(150)	0.13
4	t-Bu(<i>R,R</i>)Co ^{II} (salen)@FDU-12-C(100)	0.08
5	t-Bu(<i>R,R</i>)Co ^{II} (salen)@FDU-12-C(50)	0.04
6	t-Bu(<i>R,R</i>)Co ^{II} (salen)@FDU-12-C-reused	0.14

Table S2 Textural properties of FDU-12-C and t-Bu(*R,R*)Co^{II}(salen)@FDU-12-C(180)

Sample	BET surface area ^a (m ² g ⁻¹)	Average pore size ^a (nm)	Total pore volume ^a (cm ³ g ⁻¹)
FDU-12-C	589	12	0.56
t-Bu(<i>R,R</i>)Co ^{II} (salen)@FDU-12-C(180)	491	11	0.50

^a Data from N₂ adsorption-desorption isotherms at 77 K.

Table S3 Current of composite t-Bu(*R,R*)Co^{II}(salen)@FDU-12-C(180) and t-Bu(*R,R*)Co^{II}(salen) added directly to the electrolyte in CVs.

Sample	I (mA) ^a	The amount of t-Bu(<i>R,R</i>)Co ^{II} (salen) (mmol)	Ref
t-Bu(<i>R,R</i>)Co ^{II} (salen)@FDU-12-C(180)	0.015	0.0004 ^b	This work
t-Bu(<i>R,R</i>)Co ^{II} (salen)	0.01	0.04	¹

^a The reduction peak current corresponds to t-Bu(*R,R*)Co^{II}(salen) to [t-Bu(*R,R*)Co^I(salen)]⁻ at glassy carbon (GC) electrode (d = 2 mm);

^b Calculated by combining the Co content calculated by ICP-AES and the amount of composite material coated on the working electrode.

References

1. B.-L. Chen, H.-W. Zhu, Y. Xiao, Q.-L. Sun, H. Wang and J.-X. Lu, *Electrochem. Commun.*, 2014, **42**, 55-59.