Electronic Supplementary Information (ESI)

Co-sensitization of "H"-type dyes with planar squaraine dyes for efficient dye-sensitized solar cells

Manman Fang, Huiyang Li, Qianqian Li, Zhen Li**

Department of Chemistry, Hubei Key Lab on Organic and Polymeric Opto-Electronic Materials,

Wuhan University, Wuhan 430072, China

- Corresponding author. Phone: 86-27-68755363; E-mail: qianqian-alinda@163.com, lizhen@whu.edu.cn, or lichemlab@163.com.

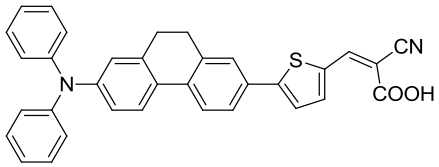
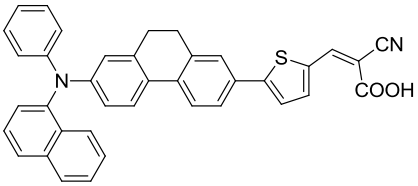
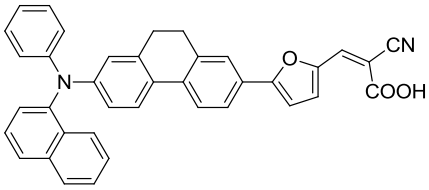
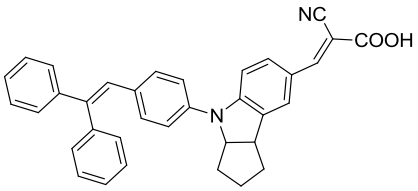
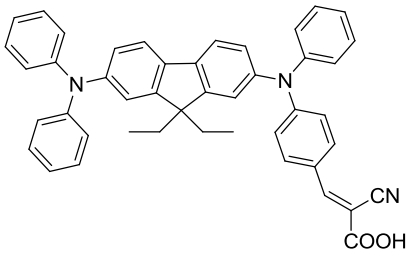
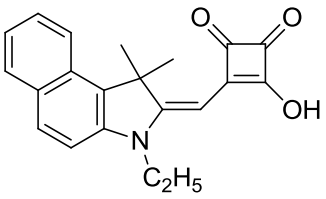
sensitizers	Structure	sensitizers	Structure
BP-1		**BP-2**	
BP-3		**D131**	
JD1		**7b**	

Chart S1 The structure of the related dye **BP-1**-**BP-3, D131, JD1** and **7b** in the literatures

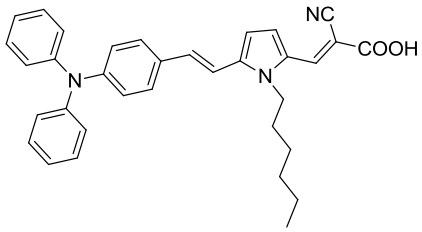


Chart S2 The structure of the reference dye **LI-54**

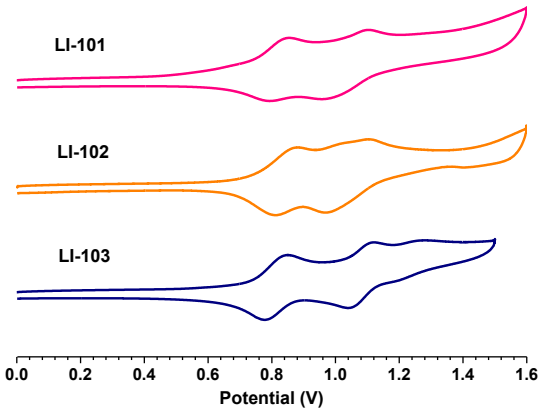


Figure S1. Cyclic voltammograms of sensitizers in CH_2Cl_2.

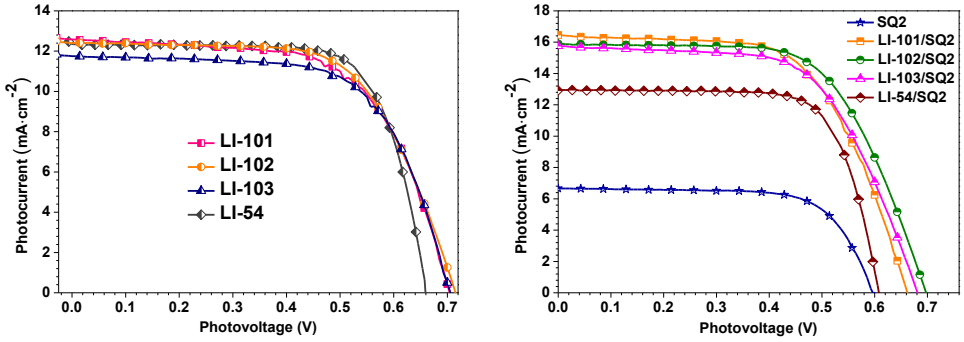


Figure S2. *J*−*V* characteristics of DSCs based on single dyes with CDCA (5 mM) and co-sensitizers without CDCA measured at simulated 100 mWcm^{-2} AM1.5 conditions.

Table S1. Performance Data of DSCs based on single dyes and co-sensitized system

sensitizer	J_{sc} (mA cm^{-2})	V_{oc} (mV)	*FF*	η (%)	Dye loading amount (10^{-7} mol cm^{-2})
LI-101[a]	12.58	704	0.62	5.51	1.60
LI-102[a]	12.40	715	0.64	5.66	2.00
LI-103[a]	11.75	704	0.66	5.42	2.40
LI-54[a]	12.35	659	0.72	5.90	1.20
SQ2[b]	6.66	597	0.69	2.76	2.60
LI-101/SQ2[b]	16.44	662	0.61	6.66	1.10 0.83
LI-102/SQ2[b]	15.89	697	0.63	7.00	2.00 0.58
LI-103/SQ2[b]	15.75	681	0.61	6.56	1.80 0.51
LI-54/SQ2[b]	12.95	609	0.72	5.71	2.40 0.99

[a] The TiO_2 electrode was stained by immersing it into the single dye solution (0.3 mM) CDCA (5 mM) in Acetonitrile/tert-Butanol (1:1, v/v) for 24 h, [b] The TiO_2 electrode was stained by immersing it into the mixture of the two dyes (0.3 mM) and in Acetonitrile/tert-Butanol (1:1, v/v) for 24 h.

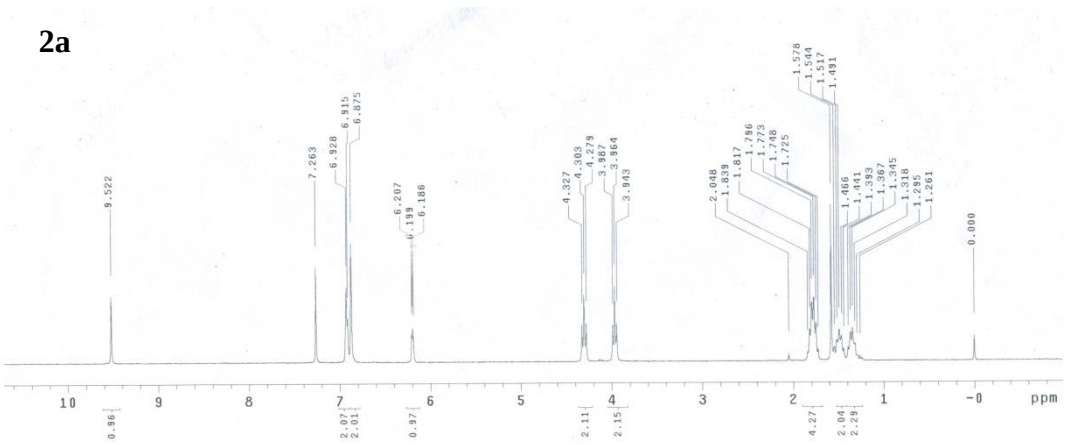


Figure S3 ^{1}H NMR spectrum of **2a**.

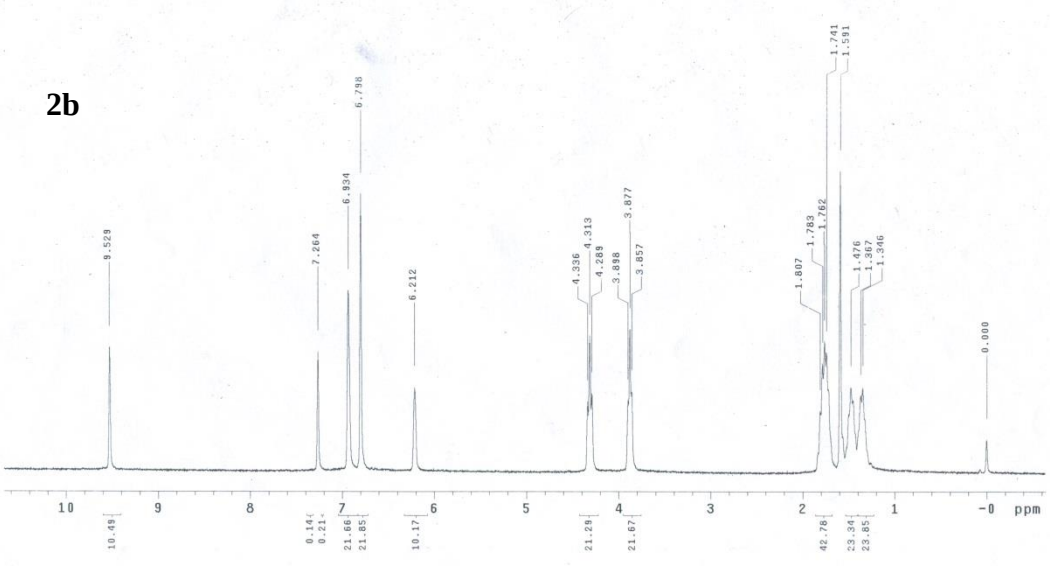


Figure S4 ^{1}H NMR spectrum of **2b**.

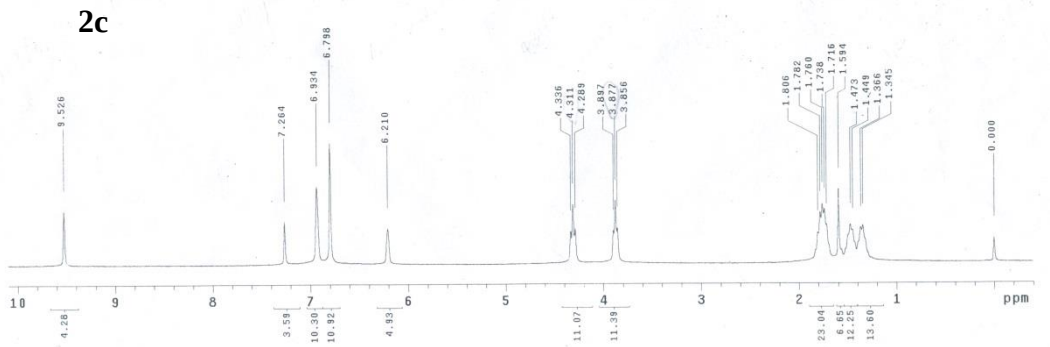


Figure S5 ^{1}H NMR spectrum of **2c**.

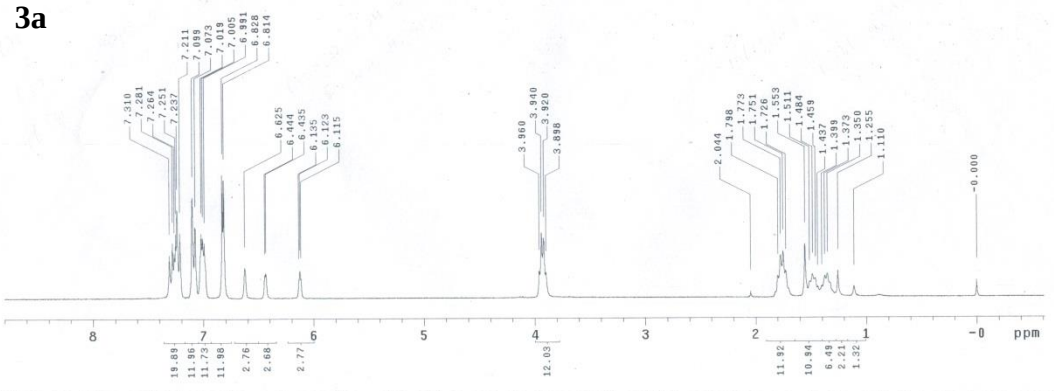


Figure S6 ^{1}H NMR spectrum of **3a**.

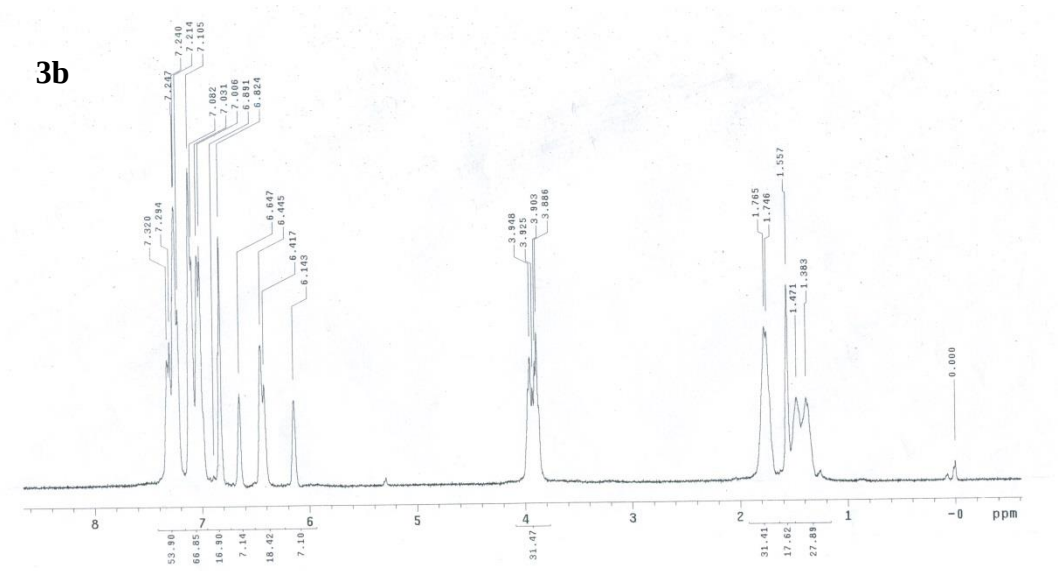


Figure S7 ^{1}H NMR spectrum of **3b**.

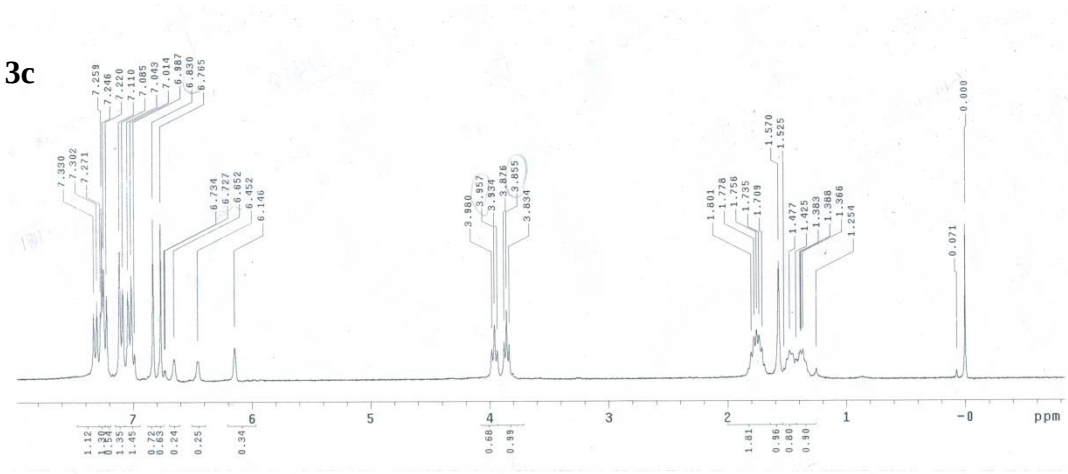


Figure S8 ^{1}H NMR spectrum of **3c**.

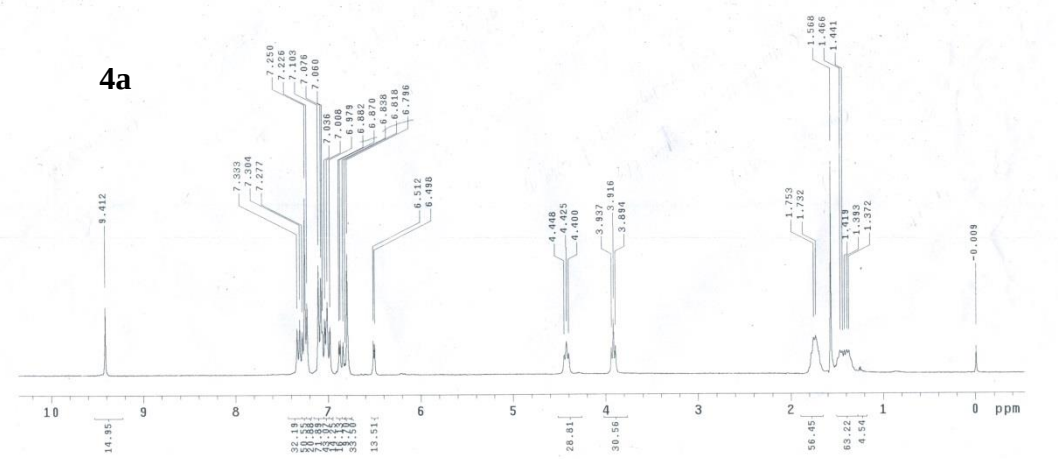


Figure S9 ^{1}H NMR spectrum of **4a**.

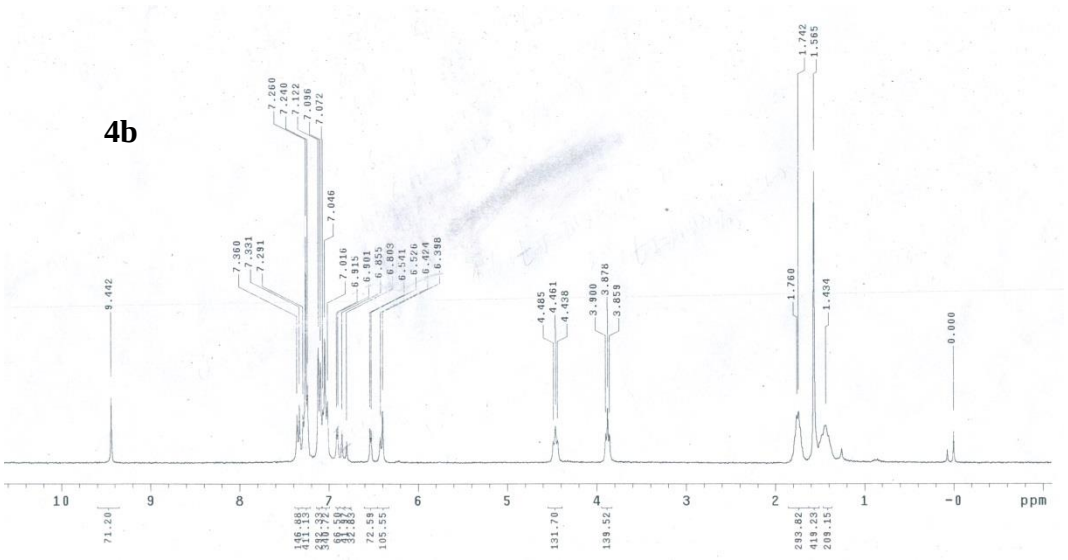


Figure S10 ^{1}H NMR spectrum of **4b**.

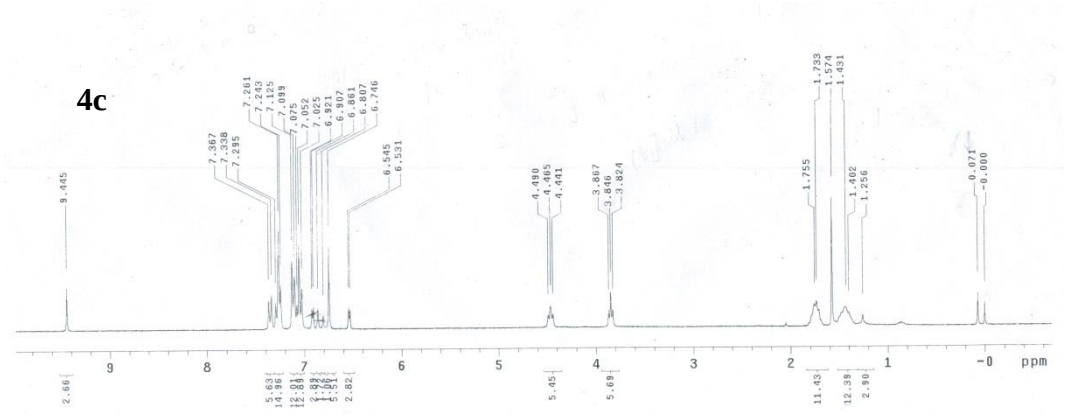


Figure S11 ^{1}H NMR spectrum of **4c**.

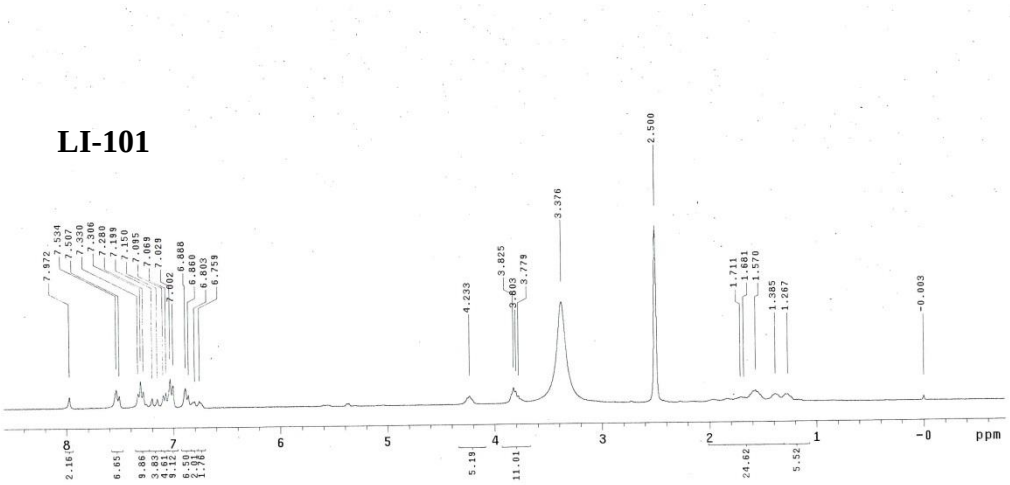


Figure S12 ^{1}H NMR spectrum of **LI-101**.

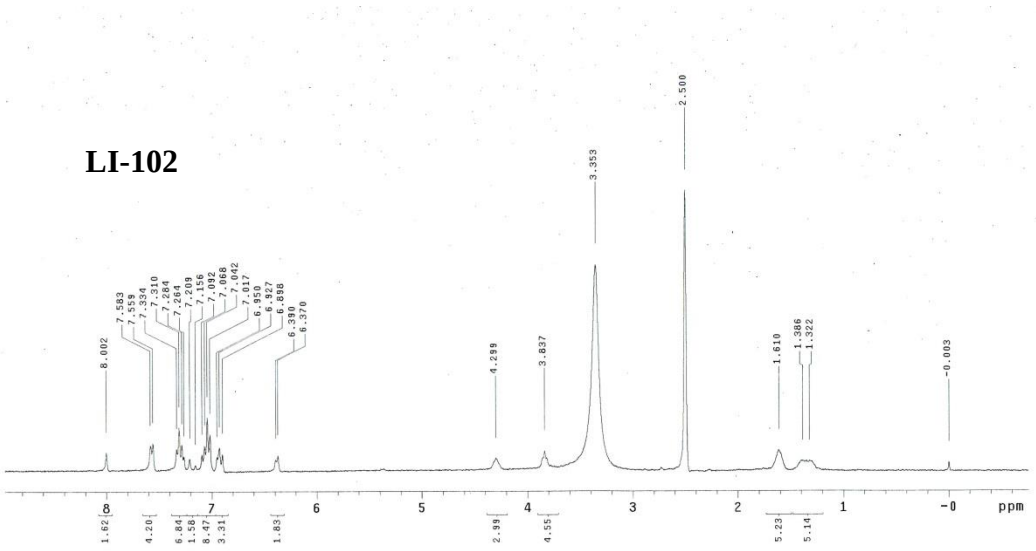


Figure S13 ^{1}H NMR spectrum of **LI-102**.

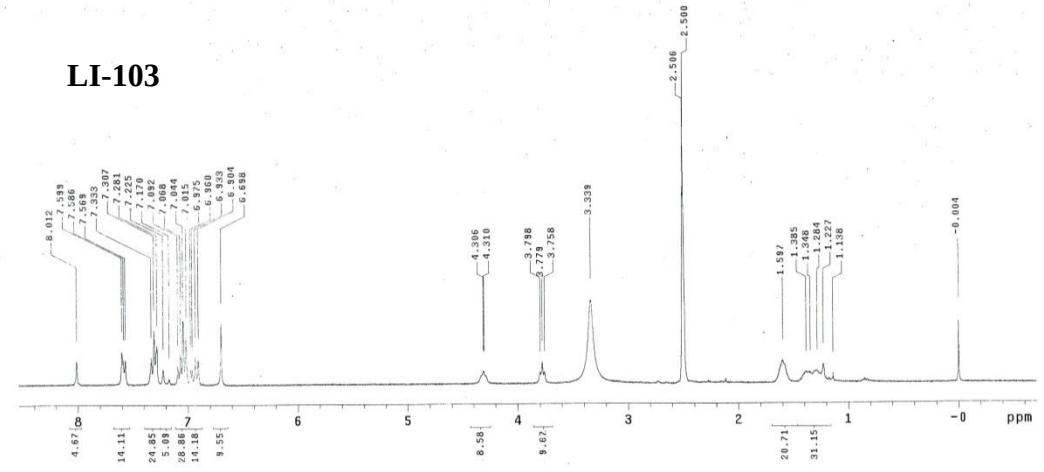


Figure S14 ^{1}H NMR spectrum of **LI-103**.