

Supporting Information

Figure S1. The SEM results of the cross-sectioned Ag electrocatalysts before (a) and after CO₂RR for 140 min (b).

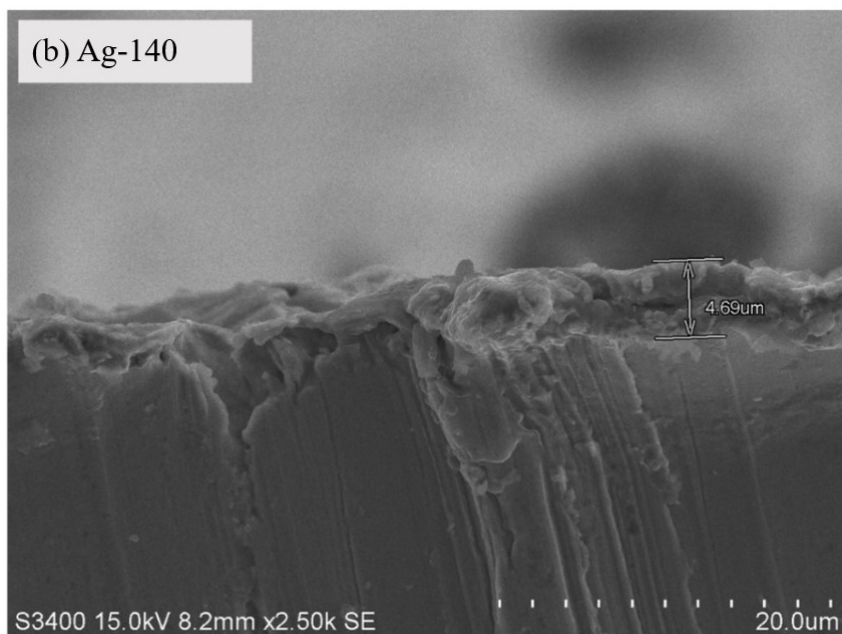
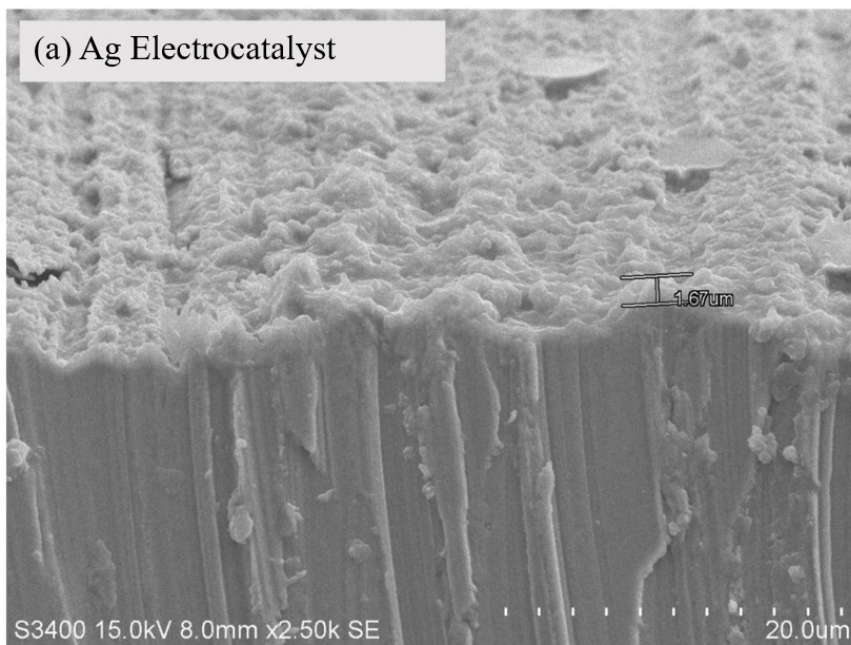


Figure S2. The CO₂ conversion after CO₂RR for 10, 20, 30, 70, and 140 min.

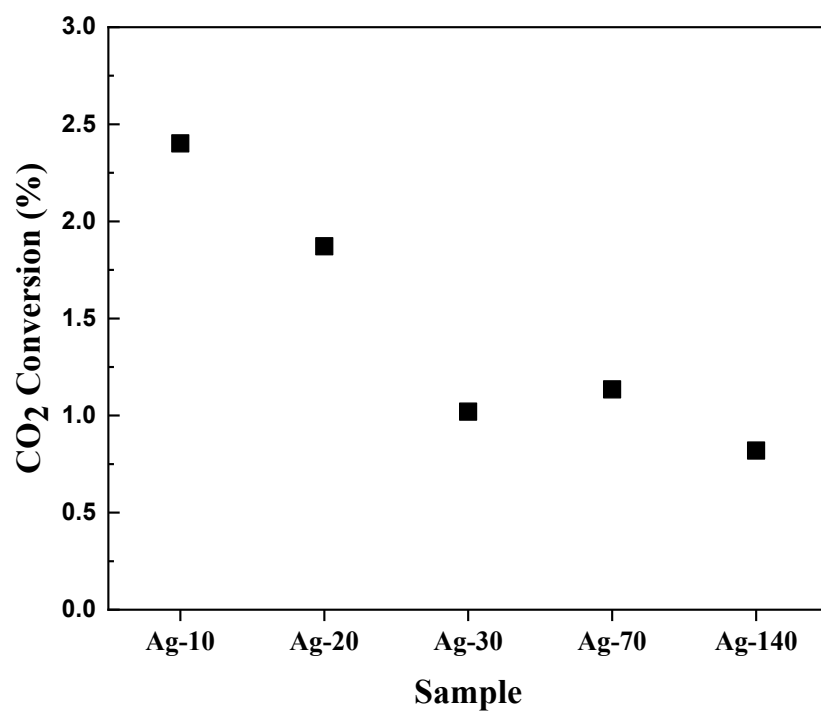
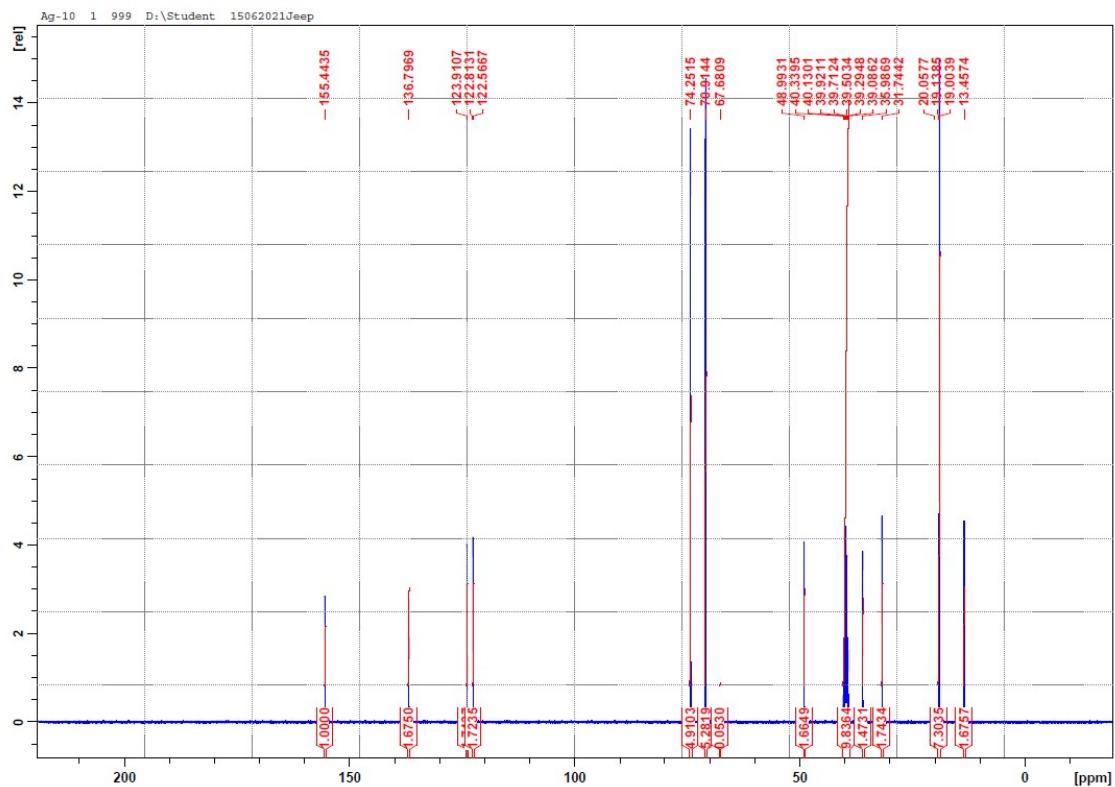
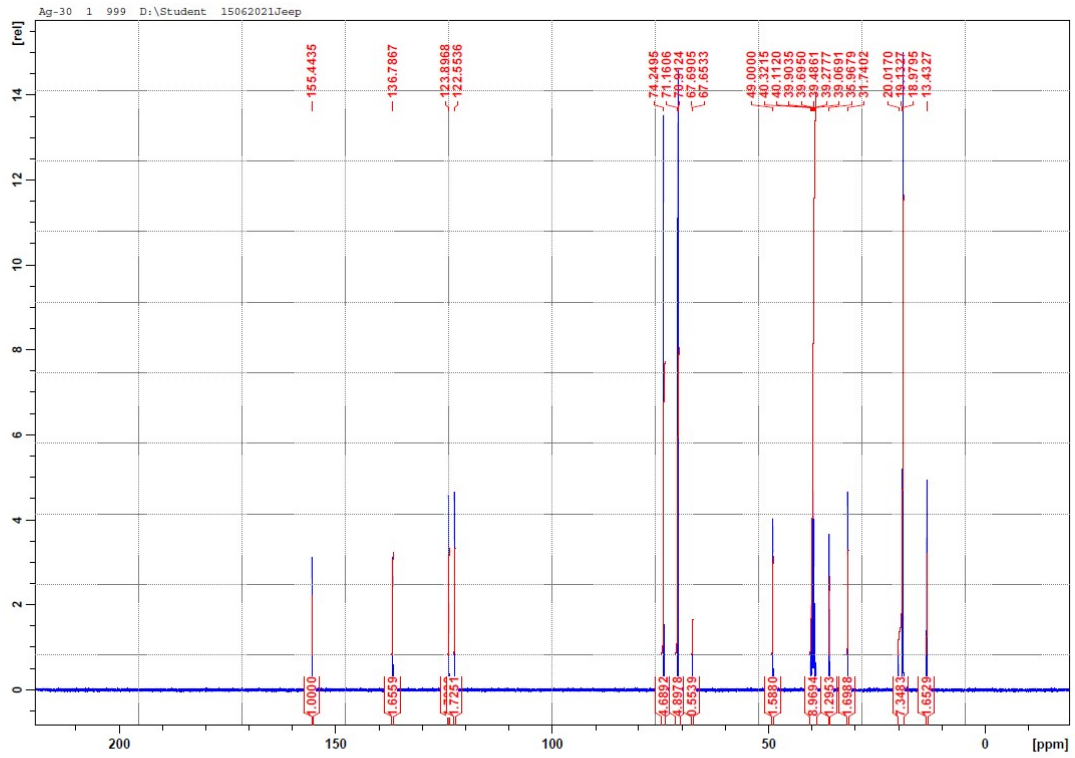
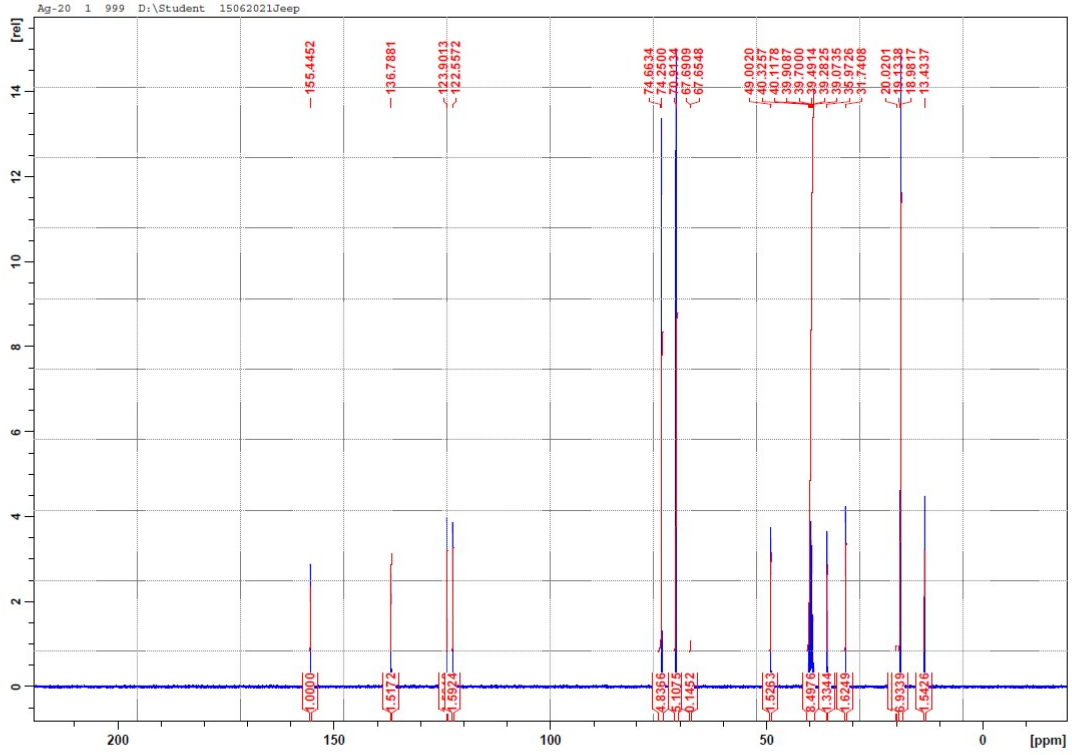
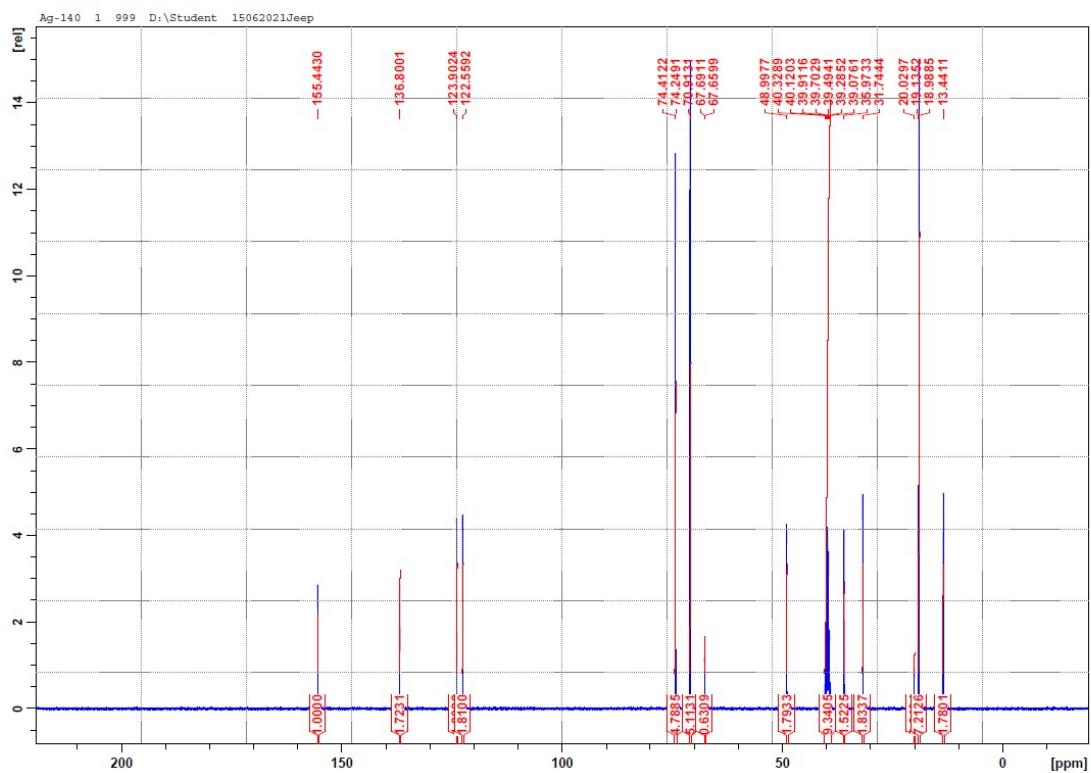
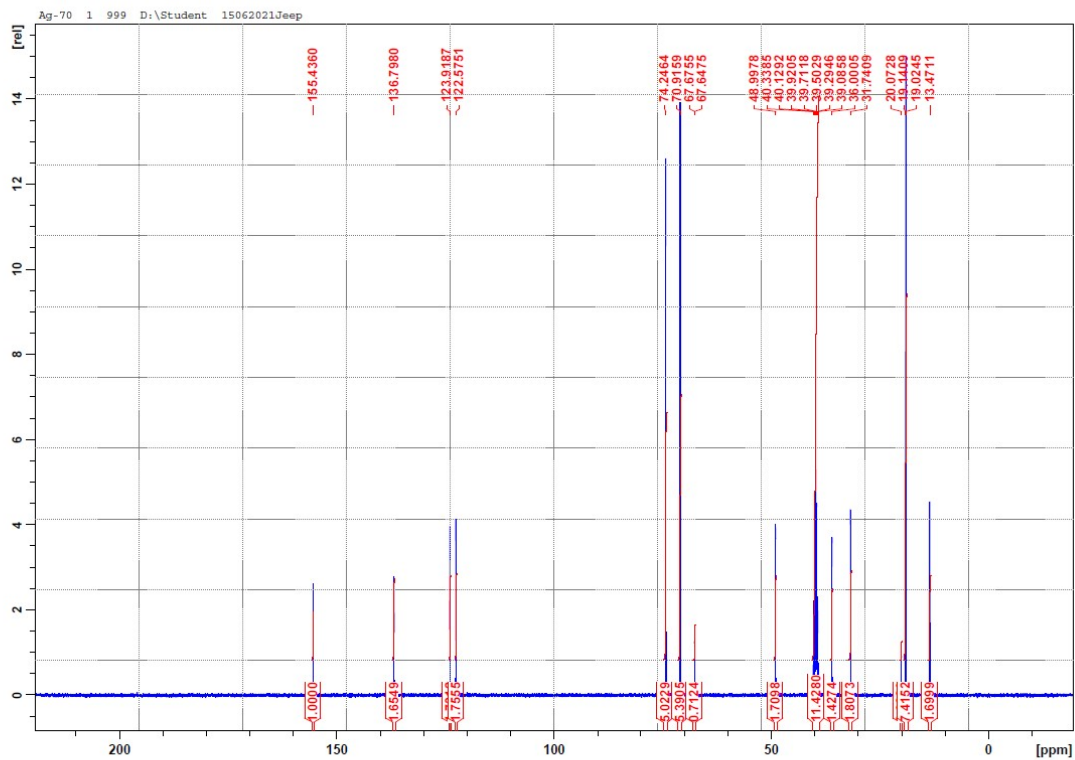


Figure S3. The NMR results of Ag-electrocatalyst after CO₂RR for 10, 20, 30, 70, and 140 min

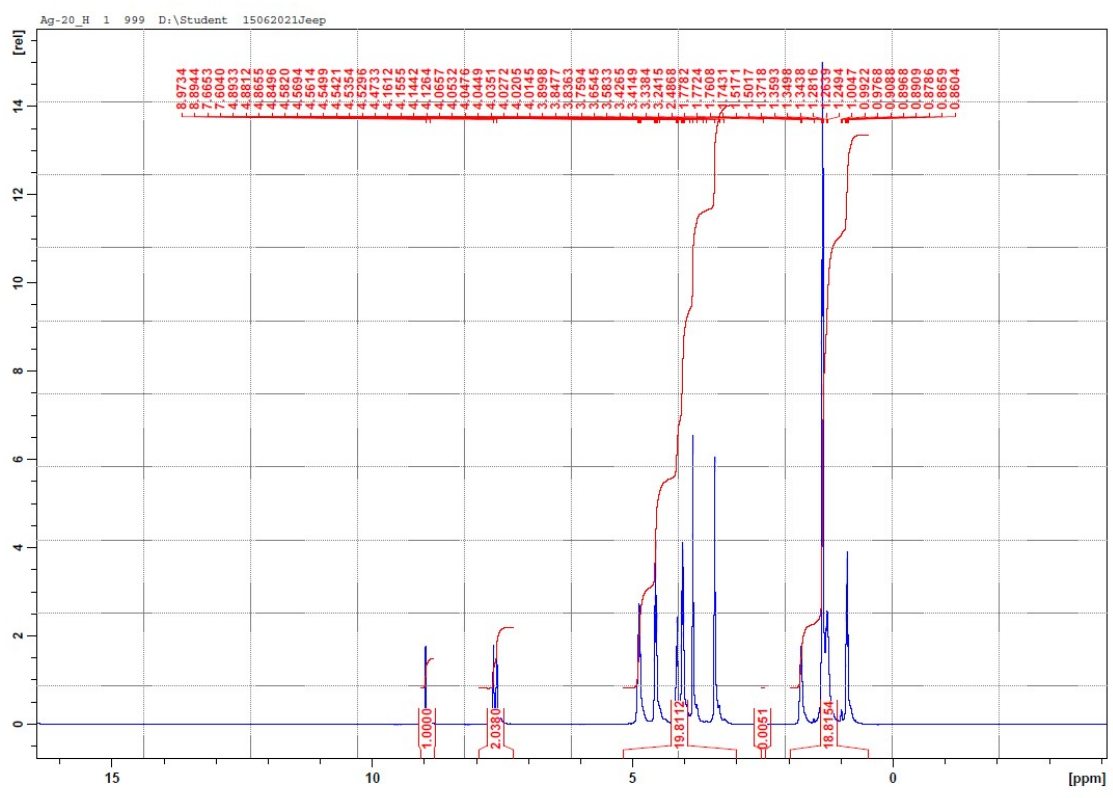
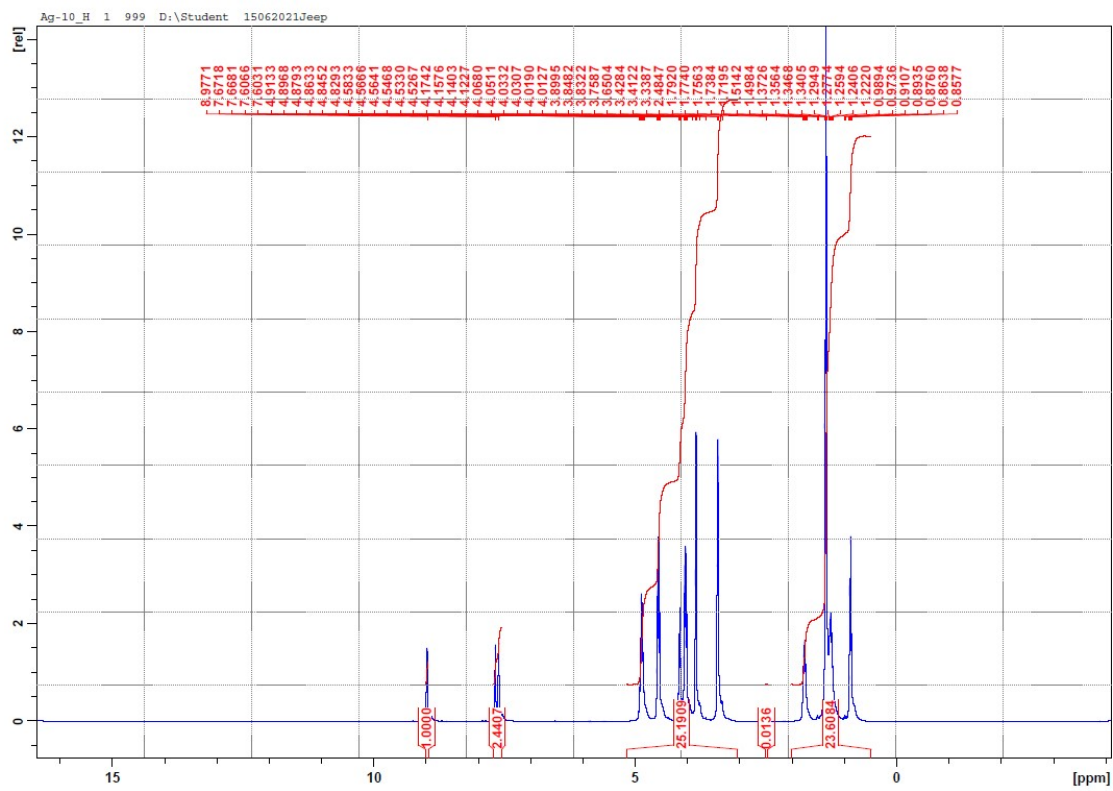
¹³C-NMR spectra of cathodic results of Ag-electrocatalyst after CO₂RR for 10, 20, 30, 70, and 140 min

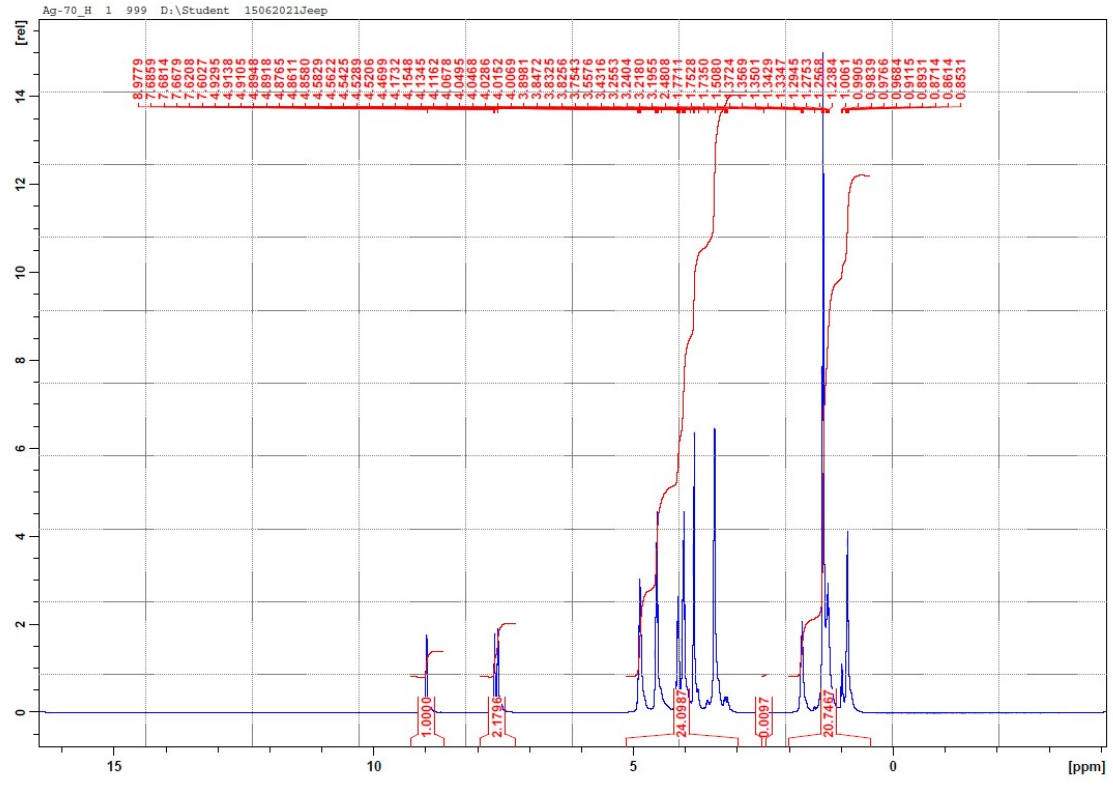
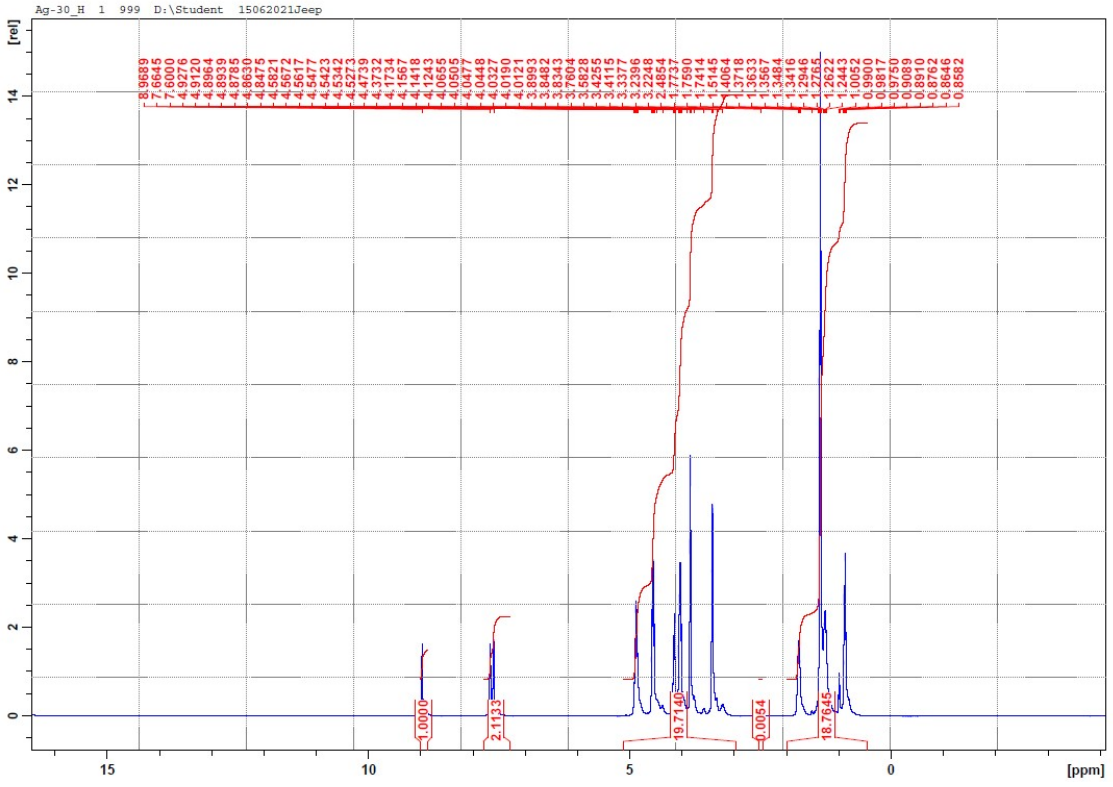






$^1\text{H-NMR}$ spectra of cathodic results of Ag-electrocatalyst after CO_2RR for 10, 20, 30, 70, and 140 min





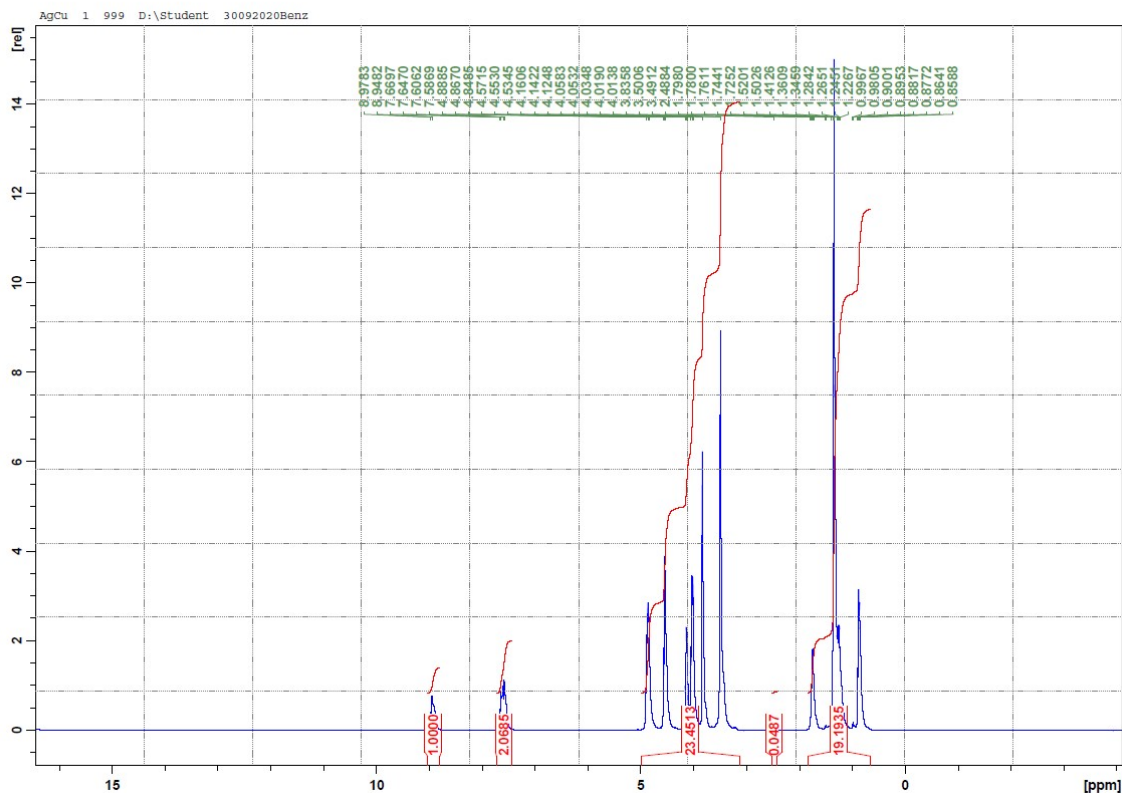
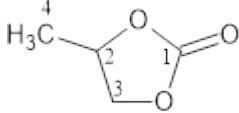
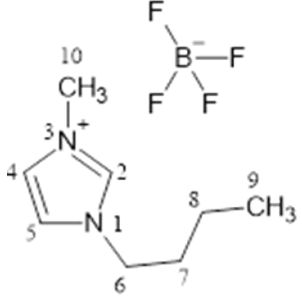
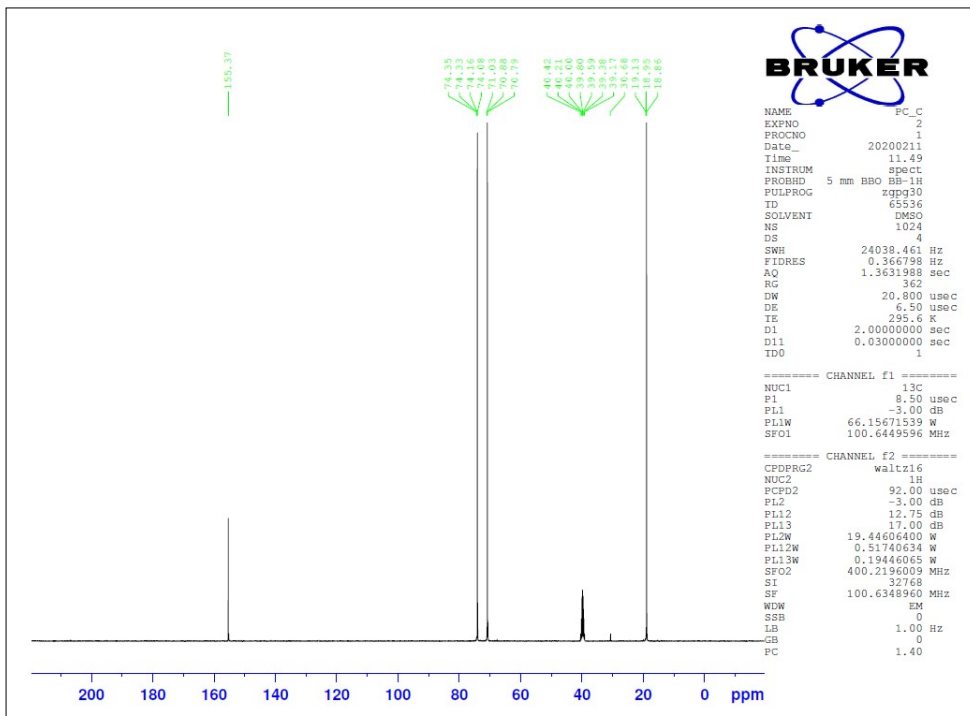
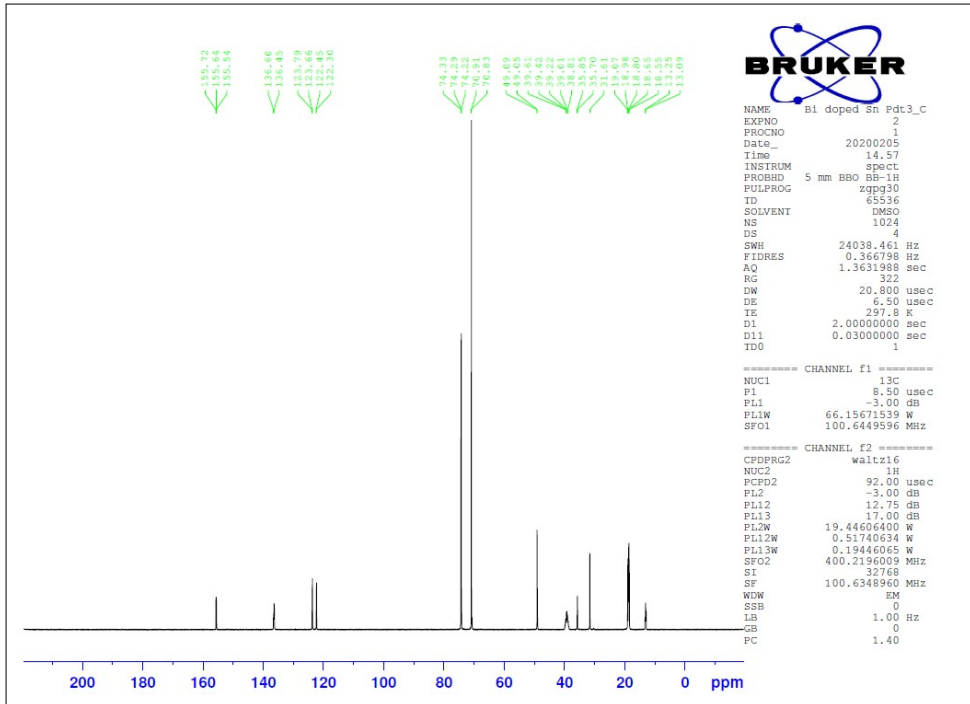
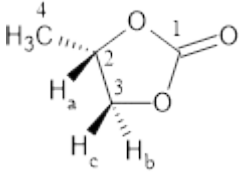
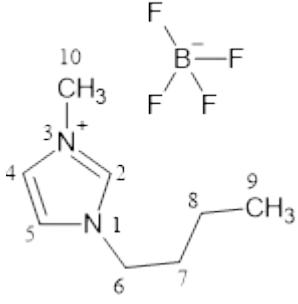


Figure S4. (i) Analysis of ^{13}C -NMR spectra of cathodic electrolytes $[\text{BMIM}]^+[\text{BF}_4]^-$ and propylene carbonate before CO_2RR

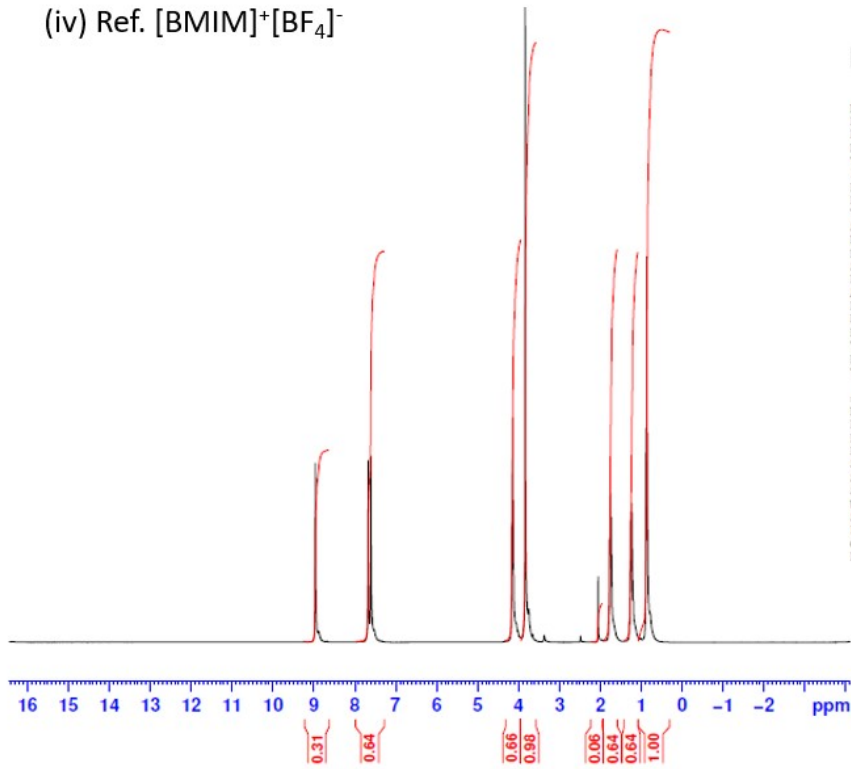
Compounds	Molecular Structure	Chemical Shift (ppm)	
		Before Reaction (0 mins)	After Reaction (70 mins)
Propylene carbonate		(C1) 155.37	(C1) 155.64
		(C2) 74.16	(C2) 74.33
		(C3) 70.88	(C3) 70.91
		(C4) 18.95	(C4) 18.80
1-Butyl-3-methylimidazolium tetrafluoroborate		(C2) 136.80	(C2) 136.60
		(C4) 122.52	(C4) 122.30
		(C5) 123.84	(C5) 123.66
		(C6) 48.96	(C6) 49.09
		(C7) 31.73	(C7) 31.61
		(C8) 19.28	(C8) 19.07
		(C9) 13.43	(C9) 13.24
(C10) 35.92	(C10) 35.70		



(ii) Analysis of $^1\text{H-NMR}$ spectra of cathodic electrolytes $[\text{BMIM}]^+[\text{BF}_4]^-$ and propylene carbonate before CO_2RR

Compounds	Molecular Structure	Chemical Shift (δ ppm)	
		Before Reaction (0 mins)	After Reaction (70 mins)
Propylene carbonate		(H2a, 1H, t) 4.88	(H2a, 1H, t) 4.84
		(H3b, 1H, dd) 4.54, $J=8$ Hz	(H3b, 1H, dd) 4.52, $J=8$ Hz
		(H3c, 1H, dd) 4.04, $J=8$ Hz	(H3c, 1H, dd) 4.01, $J=8$ Hz
		(H4, 3H, s) 1.38	(H4, 3H, s) 1.35
1-Butyl-3-methylimidazolium tetrafluoroborate		(H2, 1H, t) 8.96	(H2, 1H, t) 8.76
		(H5, 1H, t) 7.68	(H5, 1H, t) 7.53
		(H4, 1H, t) 7.61	(H4, 1H, t) 7.50
		(H6, 2H, t) 4.14	(H6, 2H, t) 4.09
		(H7, 2H, m) 1.72	(H7, 2H, m) 1.72
		(H8, 2H, m) 1.24	(H8, 2H, m) 1.29
		(H9, 3H, t) 0.87	(H9, 3H, t) 0.83
		(H10, 3H, s) 3.84	(H10, 3H, s) 3.84

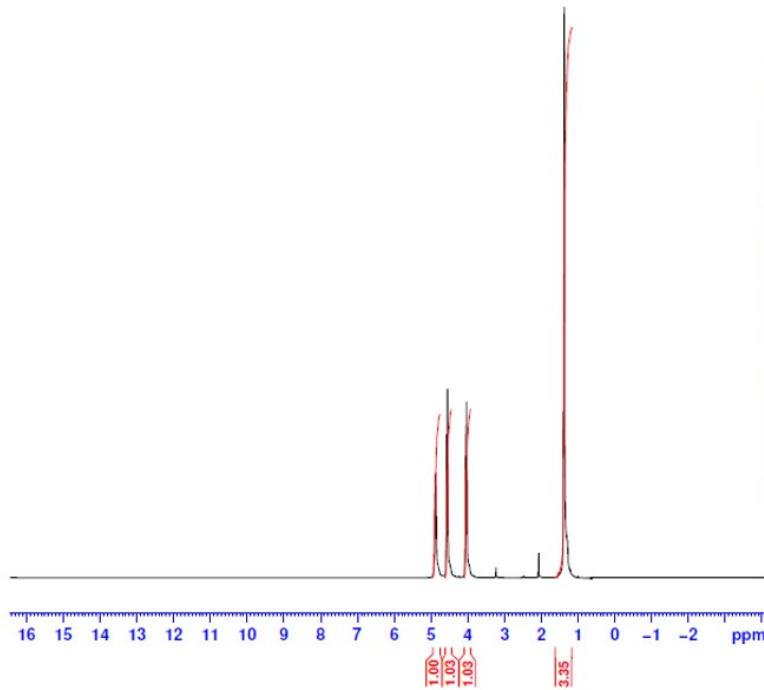
(iv) Ref. [BMIM]⁺[BF₄]⁻



```
NAME      BMIM
EXPNO     2
PROCNO    1
Date_     20200205
Time      11.40
INSTRUM   spect
PROBHD    5 mm BBO BB-1H
PULPROG   zg30
TD        65536
SOLVENT   DMSO
NS        32
DS        2
SWH       8223.685 Hz
FIDRES    0.125483 Hz
AQ        3.9846387 sec
RG        22.6
DW        60.800 usec
DE        6.50 usec
TE        296.9 K
D1        1.0000000 sec
TDO       1
```

```
===== CHANNEL f1 =====
NUC1      1H
P1        15.00 usec
PL1       -3.00 dB
PL1W      19.44606400 W
SFO1      400.2204715 MHz
SI        32768
SF        400.2180010 MHz
WDW       EM
SSB       0
LB        0.30 Hz
GB        0
PC        1.00
```

(v) Ref. Propylene Carbonate



```
NAME      PC
EXPNO     2
PROCNO    1
Date_     20200205
Time      12.08
INSTRUM   spect
PROBHD    5 mm BBO BB-1H
PULPROG   zg30
TD        65536
SOLVENT   DMSO
NS        32
DS        2
SWH       8223.685 Hz
FIDRES    0.125483 Hz
AQ        3.9846387 sec
RG        16
DW        60.800 usec
DE        6.50 usec
TE        297.0 K
D1        1.0000000 sec
TDO       1
```

```
===== CHANNEL f1 =====
NUC1      1H
P1        15.00 usec
PL1       -3.00 dB
PL1W      19.44606400 W
SFO1      400.2204715 MHz
SI        32768
SF        400.2180010 MHz
WDW       EM
SSB       0
LB        0.30 Hz
GB        0
PC        1.00
```

Figure S5. Weight of electrodes before and after CO₂RR

Sample		Weight (g)
Before CO₂RR	Ag-electrocatalyst	0.0818
After CO₂RR	Ag-10	0.0835
	Ag-30	0.0838
	Ag-70	0.0841