Pd nanoparticles on green support as dip-catalyst: A facile transfer hydrogenation of olefins and N-heteroarens in water

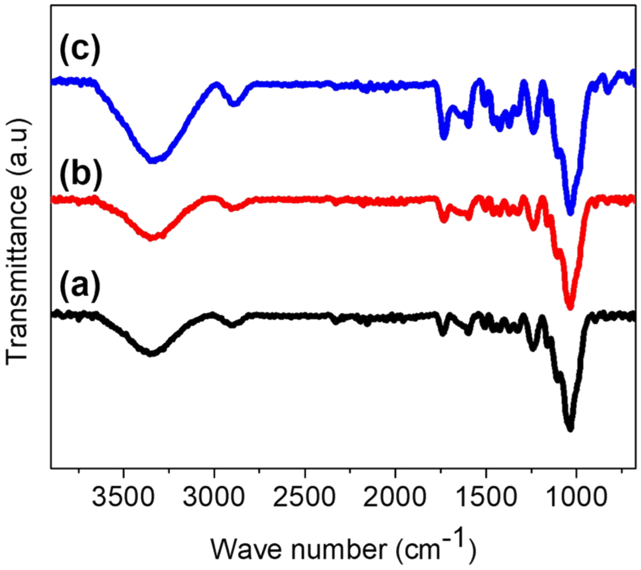


Figure S1: FT-IR spectra of a) pure green support (GS) b) Pd@GS and c) Reused Pd@GS after 32 cycles

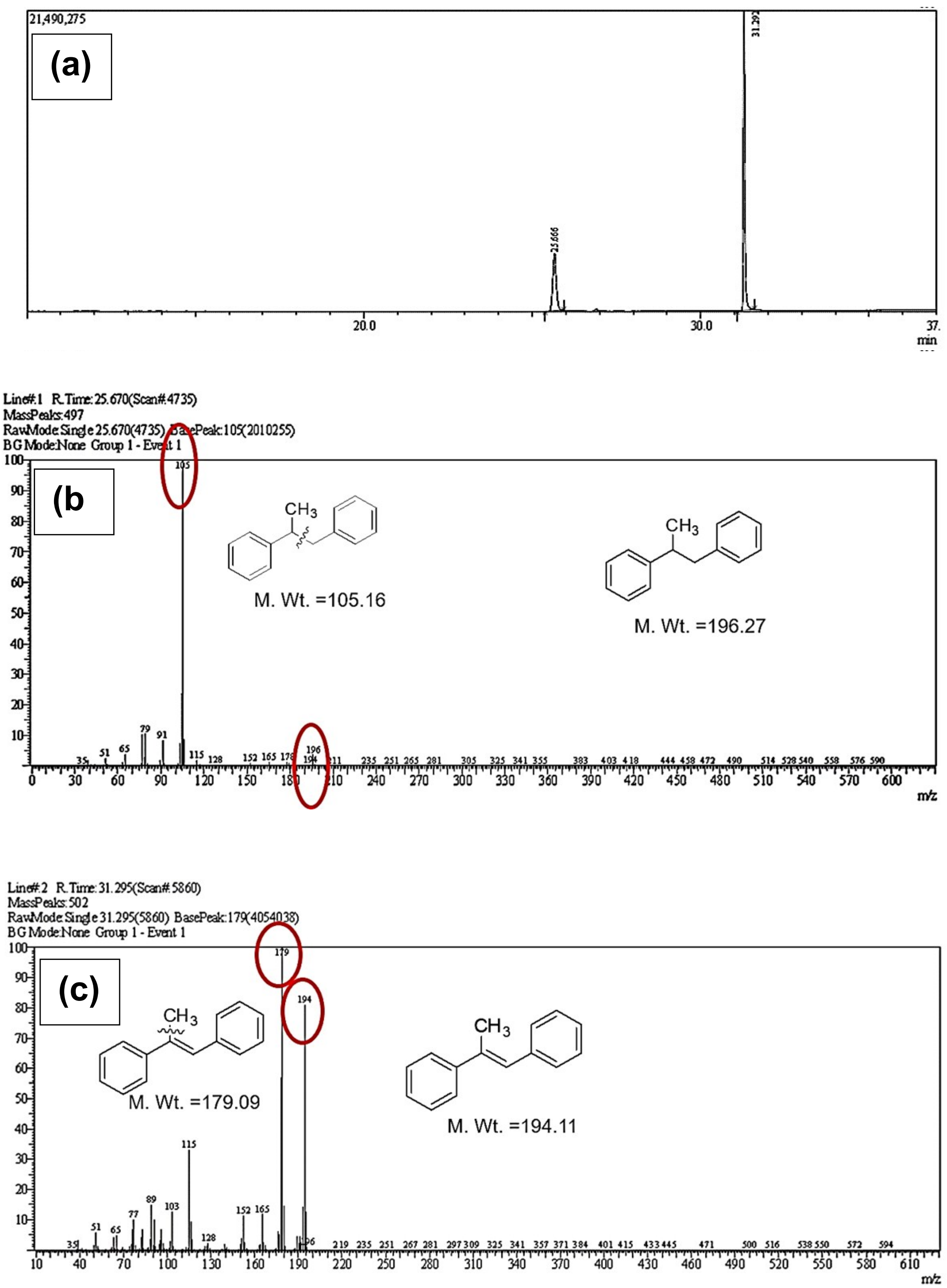


Figure S2: a) GC spectra of catalytic hydrogenations of trans- methylsitlbene b) Mass spectra of the peak at R_t=25.670 (hydrogenated product) and c) Mass spectra of the peak at R_t=31.295 (starting substrate).

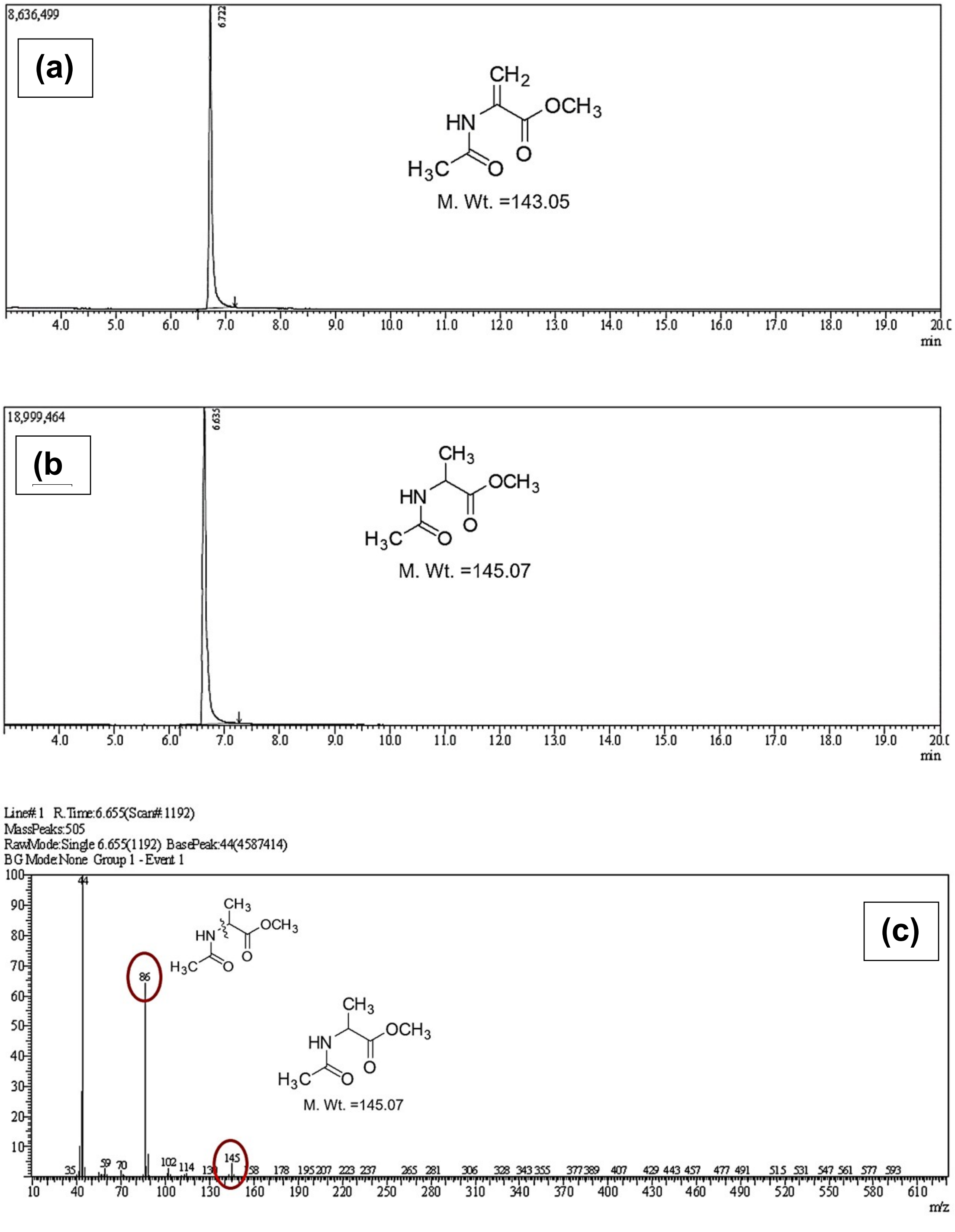


Figure S3: a) GC spectra of pure methyl- acetamidoacrylate b) GC spectra of catalytic hydrogenations of methyl- acetamidoacrylate c) Mass spectra of hydrogenated product.

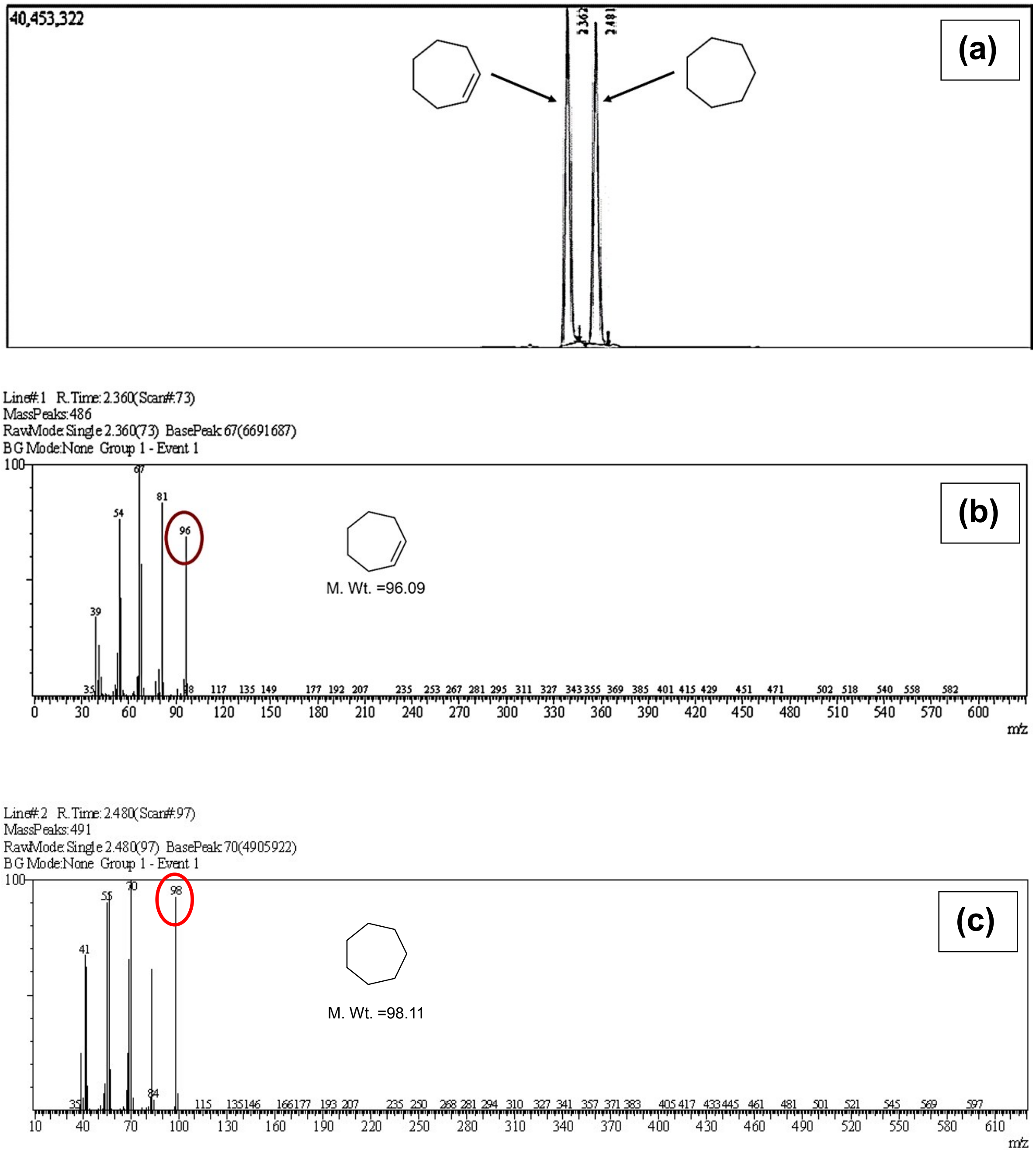


Figure S4: a) GC spectra of catalytic hydrogenations of cycloheptene b) Mass spectra of peak at R_t =2.360 (starting substrate) and c) Mass spectra of peak at R_t =2.480 (hydrogenated product).

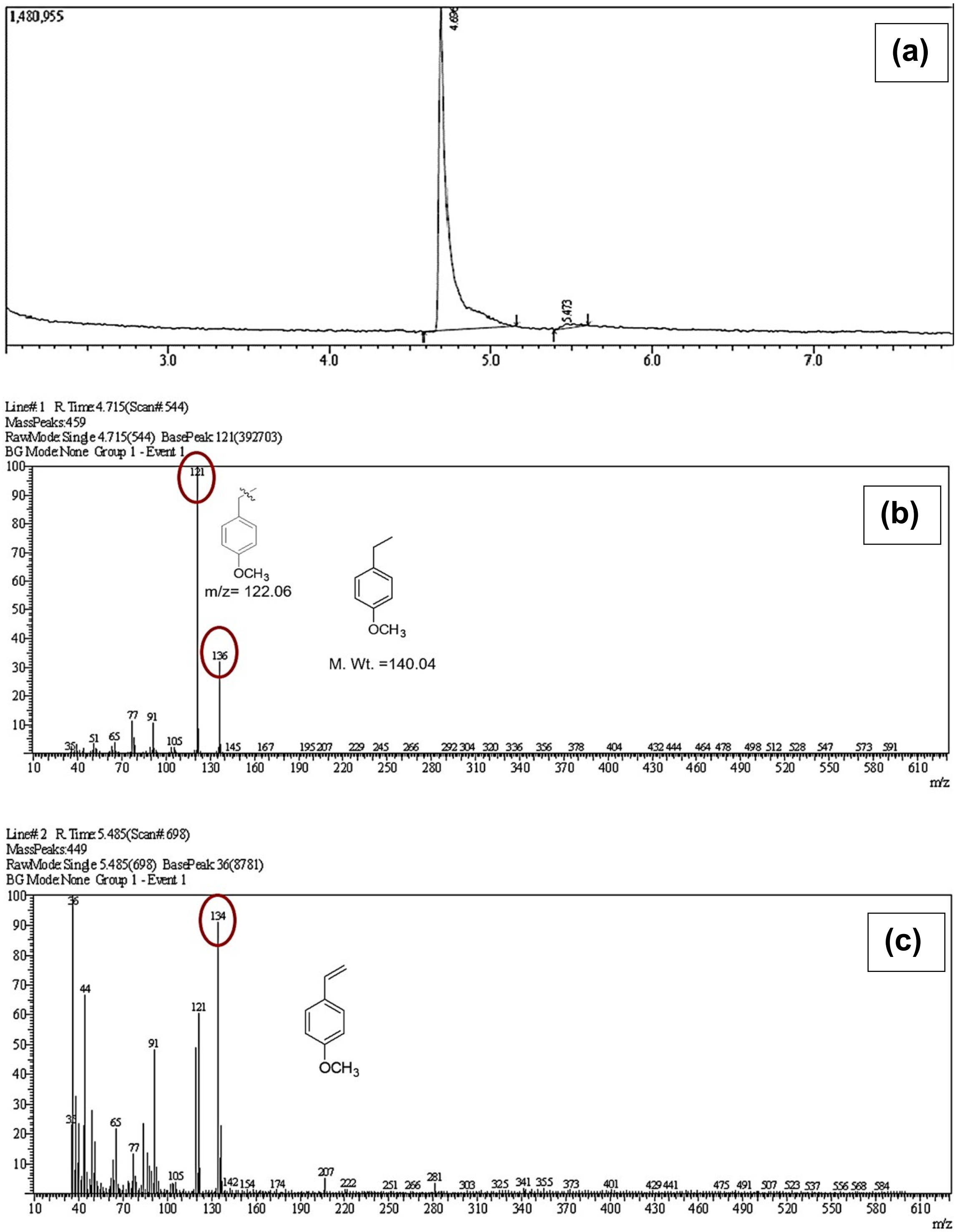
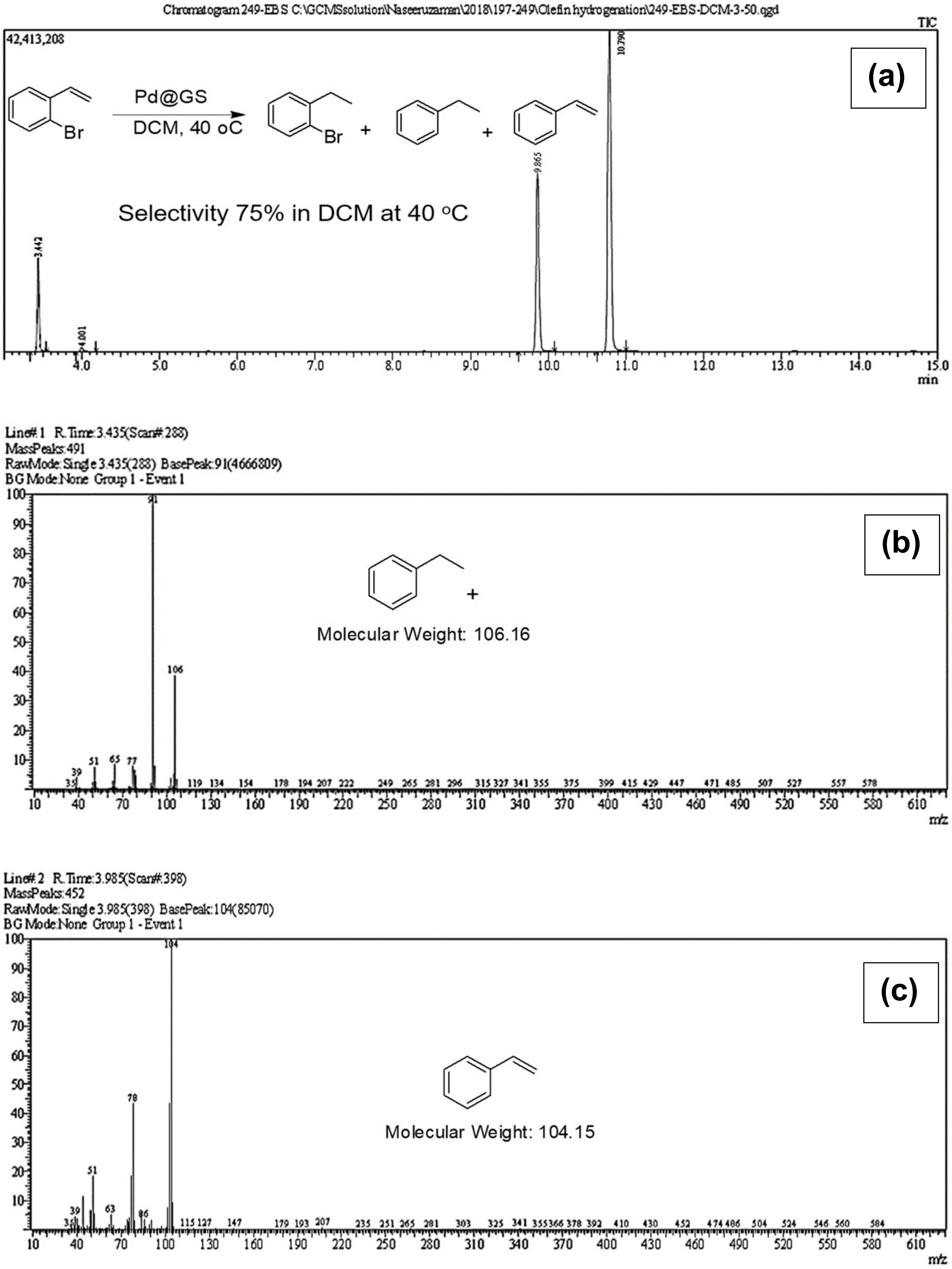


Figure S5: a) GC spectra of catalytic hydrogenations of *p*-vinyl anisole b) Mass spectra of peak at R_t =4.715 (hydrogenated product) and c) Mass spectra of peak at R_t =5.473 (starting substrate).


Chromatogram 249-EBS C:\GCMSsolution\Naseeruzaman\2018\197-249\Olefin hydrogenation\249-EBS-DCM-3-50.qgd
TIC
42,413,208
(a)
Br
Pd@GS
DCM, 40 oC
Br
+
+
Selectivity 75% in DCM at 40 °C
3.442
4.001
9.865
10.790
4.0
5.0
6.0
7.0
8.0
9.0
10.0
11.0
12.0
13.0
14.0
15.0
min
Line#1 R.Time:3.435(Scan#:288)
MassPeaks:491
RawMode:Single 3.435(288) BasePeak:91(4666809)
BG Mode:None Group 1 - Event 1
(b)
+
Molecular Weight: 106.16
91
106
35
39
51
65
77
119
134
154
178
194
207
222
249
265
281
296
315
327
341
355
375
399
415
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447
471
485
507
527
557
578
m/z
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(c)
Molecular Weight: 104.15
104
78
51
63
39
35
86
115
127
147
179
193
207
235
251
265
281
303
325
341
355
366
378
392
410
430
452
474
486
504
524
546
560
584
10
40
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130
160
190
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340
370
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610
m/z
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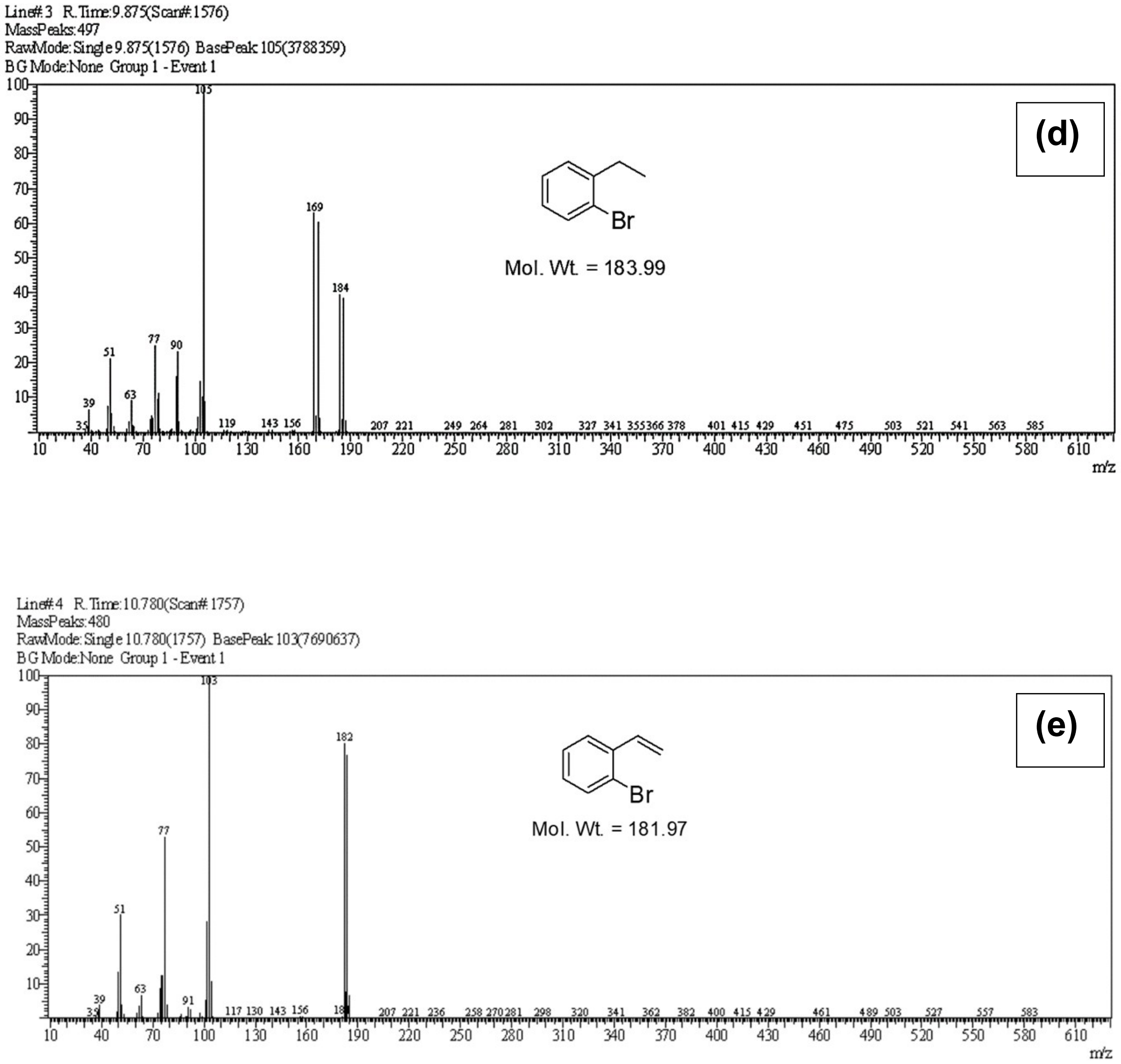

Figure S6: a) GC spectra of catalytic hydrogenations of *o*-bromostyrene b) Mass spectra of peak at R_t =3.435 (de-halogenated but hydrogenated product) and c) Mass spectra of peak at R_t =3.9853 (de-halogenated product) d) Mass spectra of peak at R_t =9.875 (hydrogenated product) e) Mass spectra of peak at R_t =10.780 (unreacted substrate).

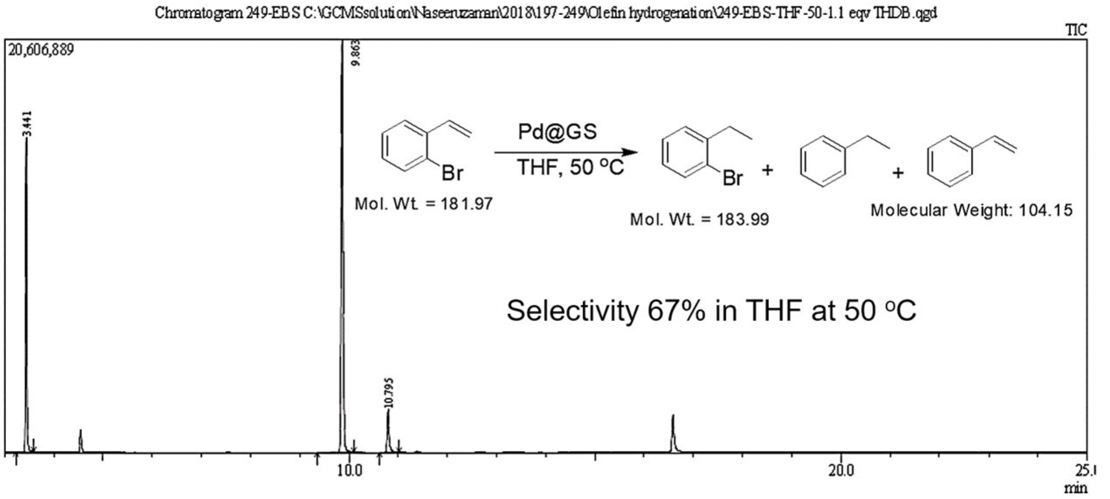

Figure S7: a) GC spectra of catalytic hydrogenations of *o*-bromostyrene in THF at 50 ^{o}C.

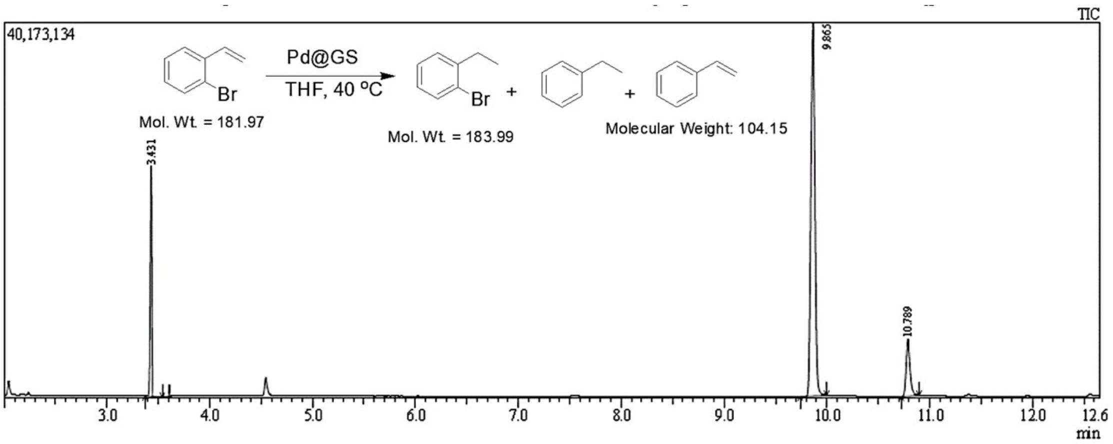

Figure S8: a) GC spectra of catalytic hydrogenations of *o*-bromostyrene in THF at 40 ^{o}C.

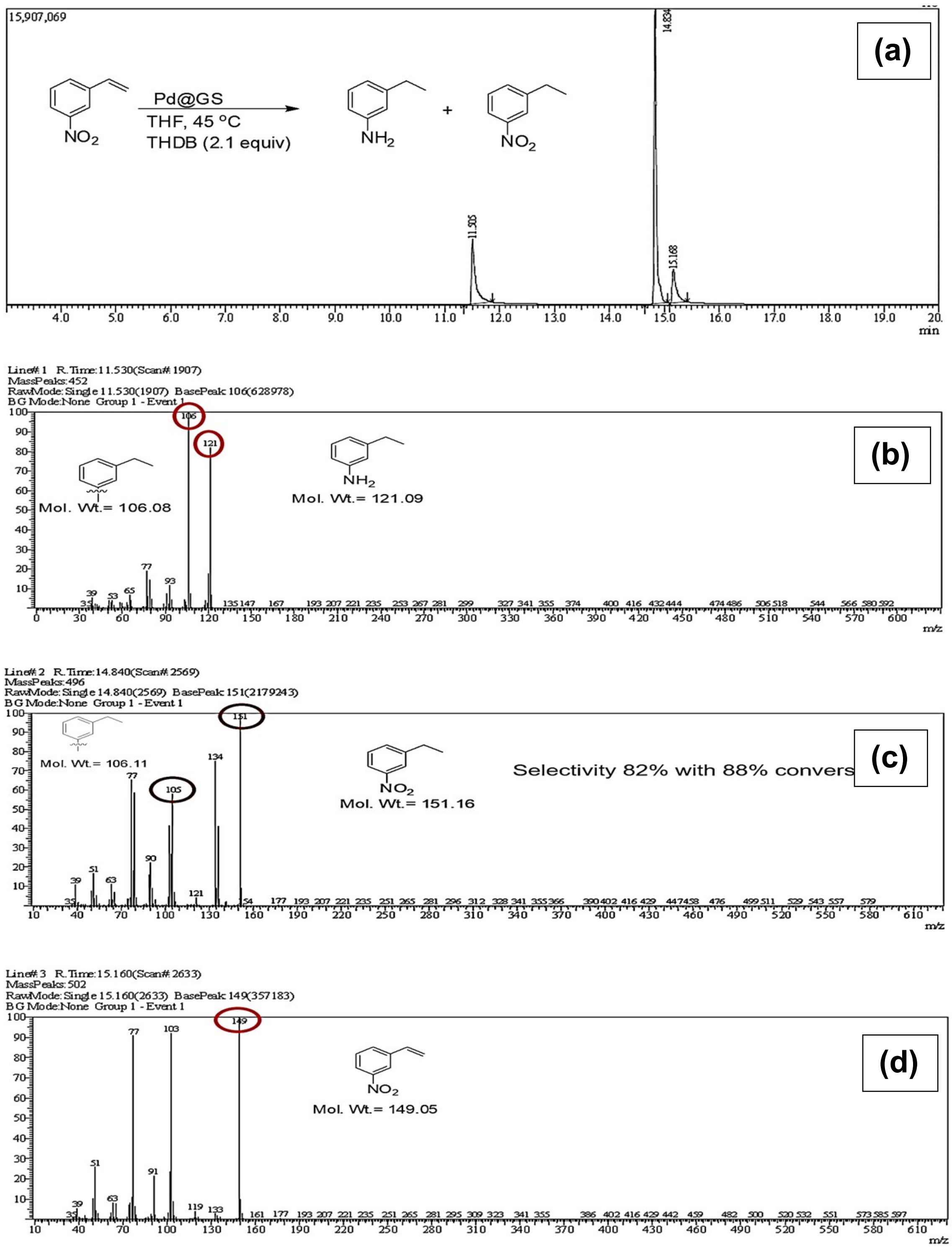

Figure S9: a) GC spectra of Pd@GS catalyzed hydrogenation of *m*-nitrostyrene at 45 ^{o}C in THF with 2.1 equiv. THDB b) Mass spectra of peak at R_t =11.506 (where both functional group reduced) c) Mass spectra of peak at R_t =14.840 (Selectively olefin group hydrogenated) d) *m*-nitrostyrene (unreacted).

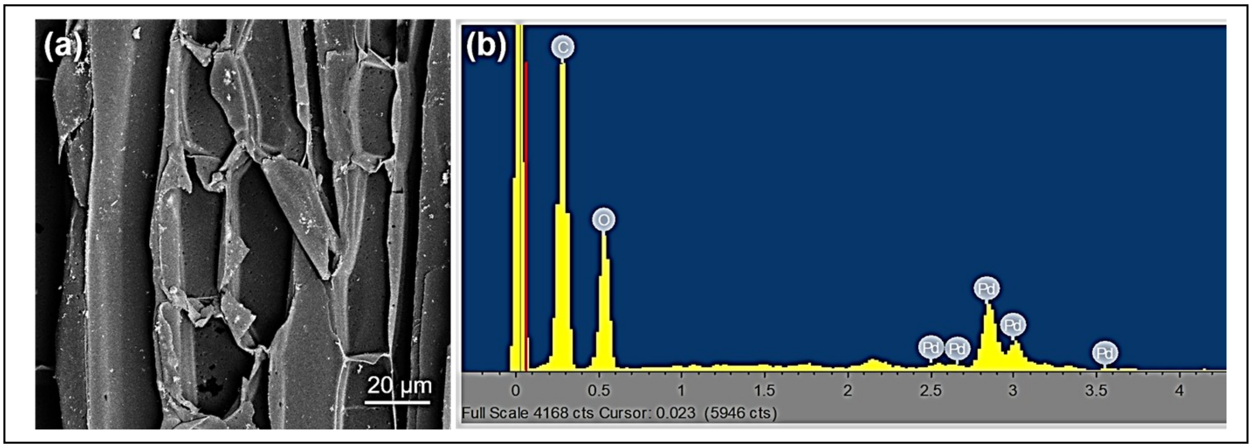

Figure S10: (a) SEM image and (b) EDS spectrum of Re-used Pd@GS.