

Supplementary Information

Production of furfural from xylose catalyzed by a novel calcium gluconate derived carbon solid acid in 1,4-dioxane

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Table S1 The elemental analysis of fresh and used catalyst

Entry	S contents (%)	SO ₃ H density ^a (mmol/g)
SC-GCa-600	3.072	0.96
SC-GGa-700	3.776	1.18
SC-GCa-800	4.256	1.33
Used SC-GCa-800 ^b	3.201	1.00

^b the 5th recycling SC-GCa-800 catalyst

Table S2 Furfural production from xylose using various catalysts

Catalyst	Solvent	Reaction conditions	Furfural yield (%)	References
SC-GCa-800	1,4-dioxane	140 °C, 40 min	76.9	This work
S-RFC	GVL	170 °C, 15 min	80	33
PTSA-POM	GVL	170 °C, 10 min	80.4	43
S-DP	Water/CPME	200 °C, 50 min	76	44
TPA	Water/Toluene	190 °C, 180 min	70.9	45
Ionic liquid	Water/butanone	150 °C, 30 min	60	30

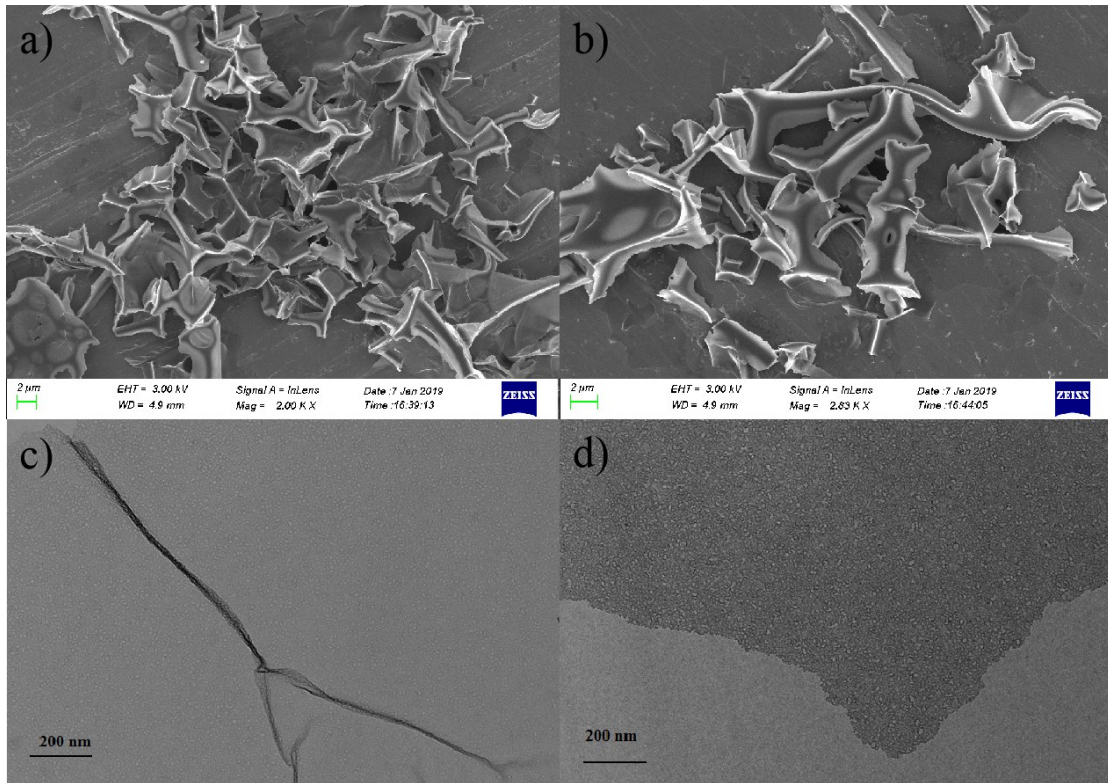


Fig. S1. SEM images of C-GCa-800 (a) , SC-GCa-800 (b) and TEM images of C-GCa-800 (c) , SC-GCa-800 (d)

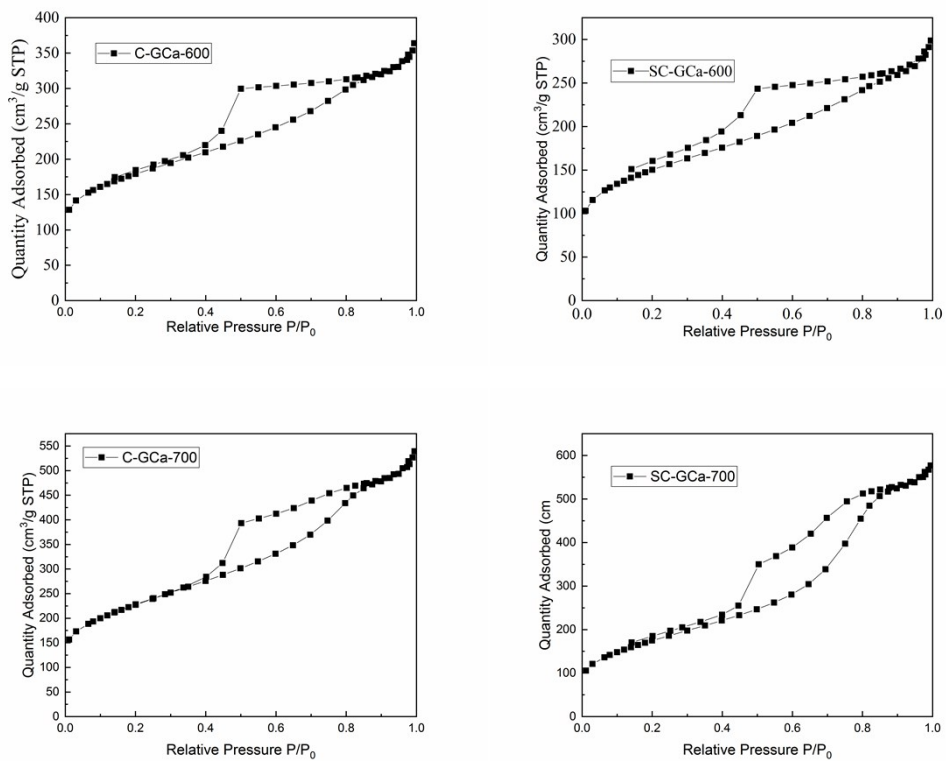


Fig.S2 N₂ adsorption/desorption isotherms of a) C-GCa-600, b) SC-GCa-600, c) C-GCa-

700 and d) SC-GCa-700.

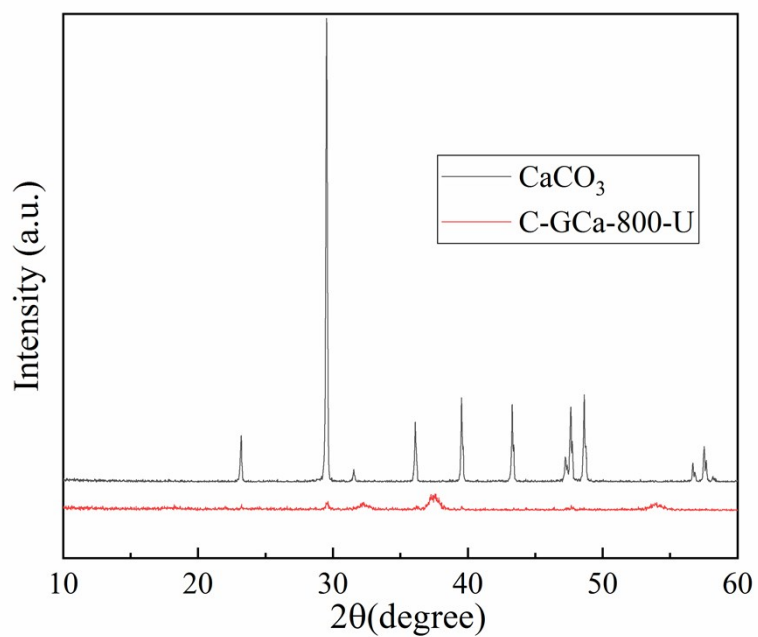


Fig. S3 XRD patterns obtained for CaCO₃ and C-GCa-800 untreated with HCl (C-GCa-800-U)

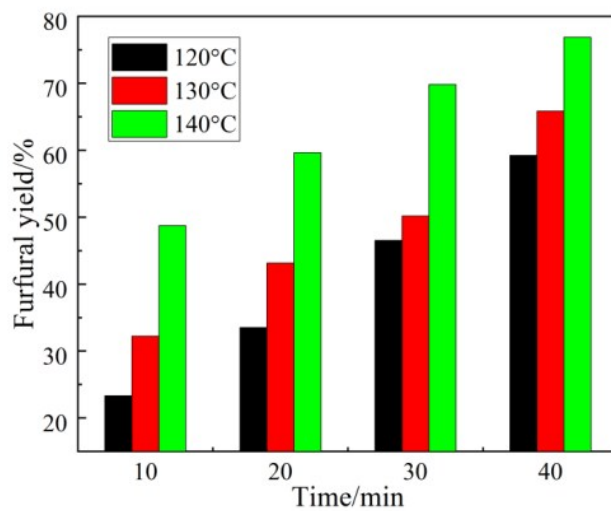


Fig. S4 Effects of reaction temperature (120-140 °C) and residence time (10-40 min). Reaction conditions: 5 mL 1,4-dioxane, 50 mg catalyst, 100 mg xylose.

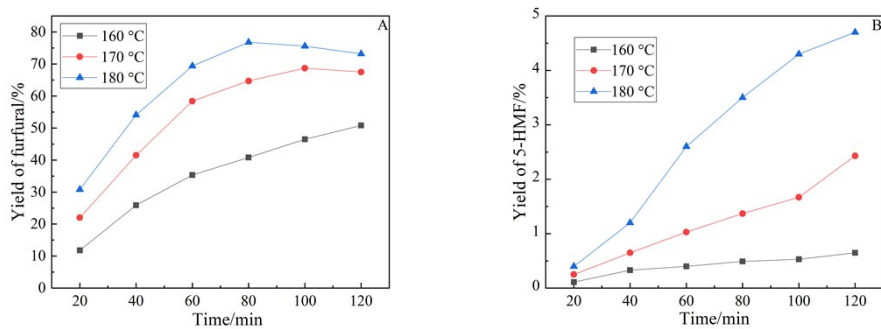
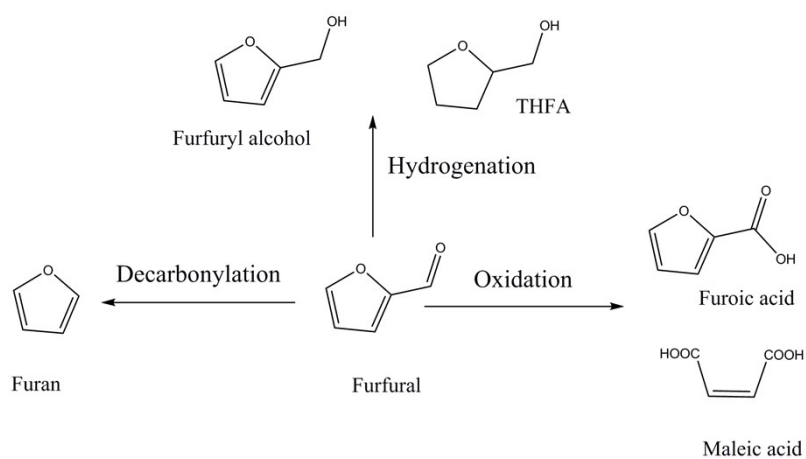
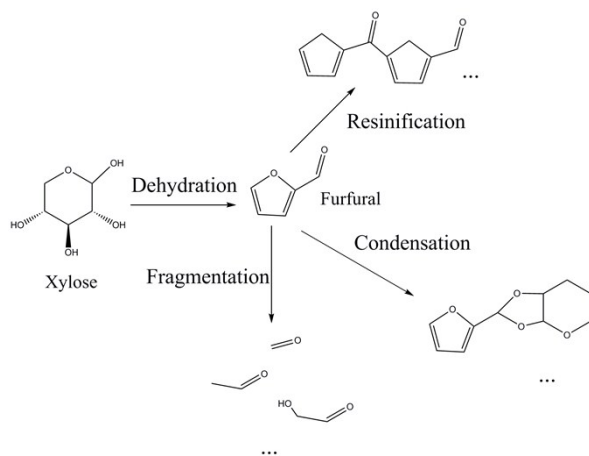


Fig. S5 Furfural production from corn stover. Reaction conditions: 15 mL 1,4-dioxane, 100 mg SC-GCa-800, 200 mg corn stover.



Scheme S1. Conversion of furfural to various valued chemicals.



Scheme S2. Xylose dehydration to furfural and some plausible side reactions in the process.

