

Production of methyl levulinate from cellulose: the selectivity and mechanism study

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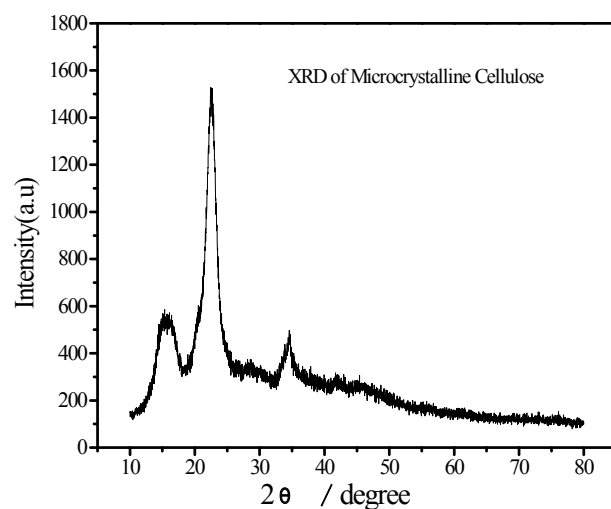


Figure S1 XRD pattern of the microcrystalline cellulose (untreated and directly used in reaction).

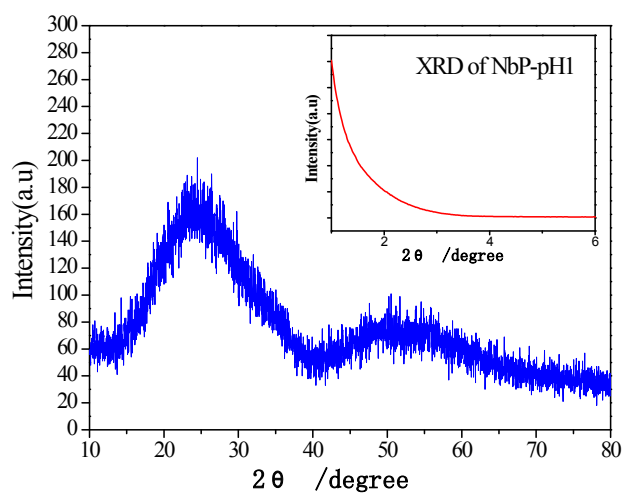


Figure S2 XRD on amorphous NbP-pH1 catalyst.

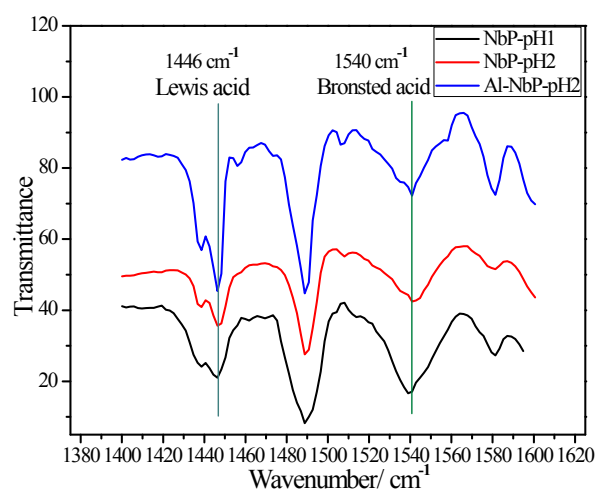


Figure S3 The Py-FTIR spectrum of solid acids used in cellulose alcoholysis, scanned at 373K.

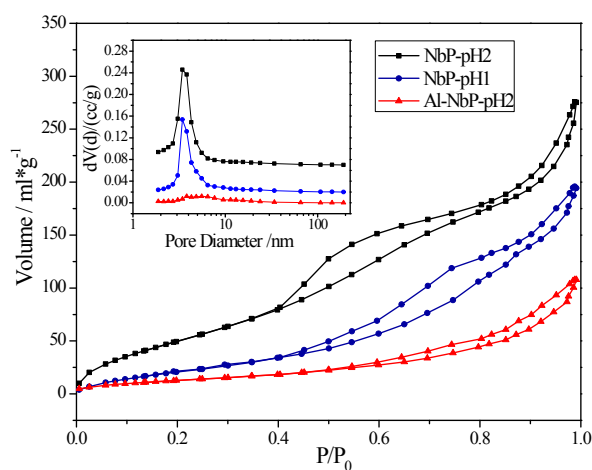


Figure S4 N_2 adsorption-desorption isotherms and pore size distributions of three solid acids used in cellulose alcoholysis, measured at -196°C .

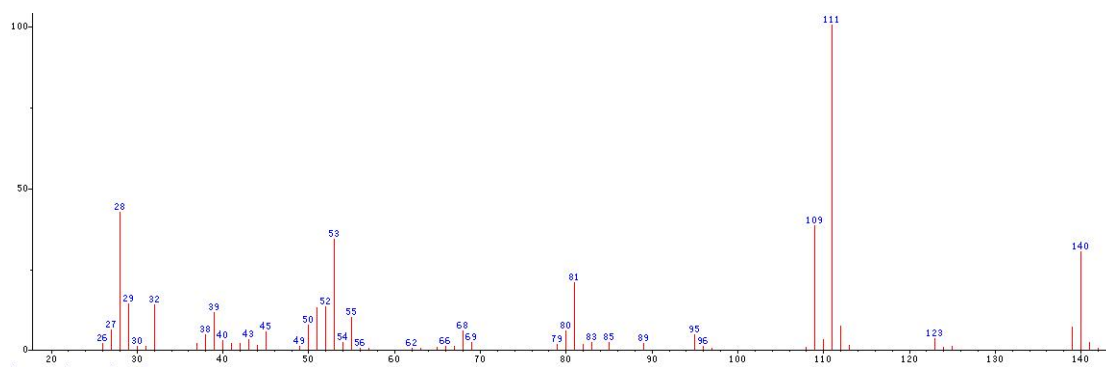


Figure S5 MS spectrum of 5-MMF analyzed by GC-MS.

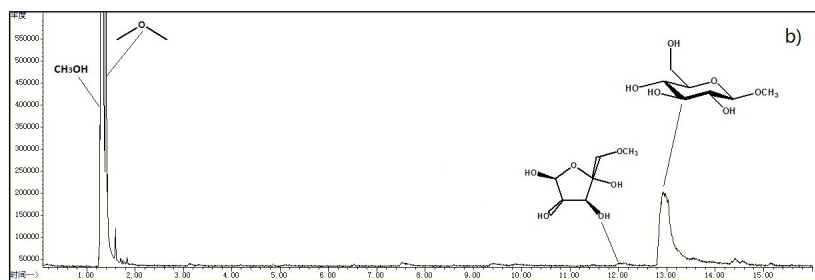


Figure S6 GC-MS spectra of reaction solution catalyzed by a) NbP-pH1 and b) NbP-pH2, reacted at 180 °C for short time (2h).

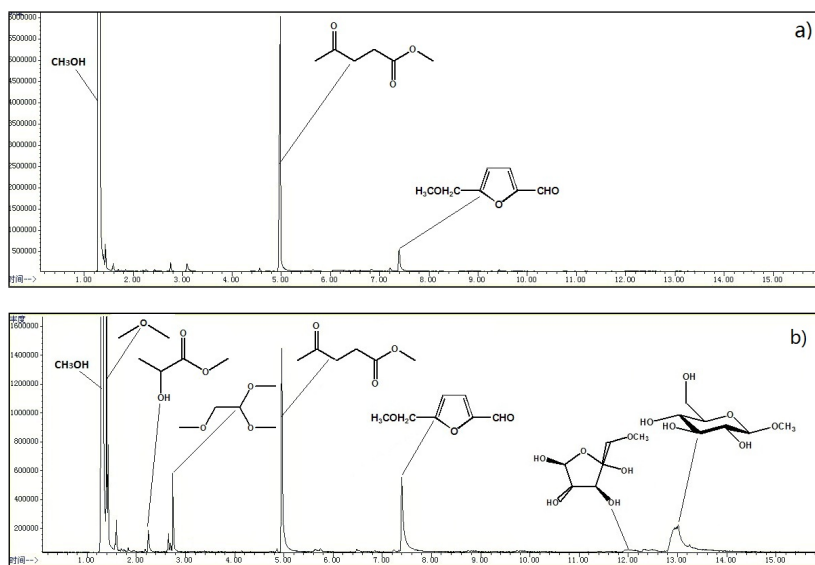


Figure S7 GC-MS spectra of reaction solution catalyzed by a) NbP-pH1 and b) NbP-pH2 reacted at 180 °C for 8h.

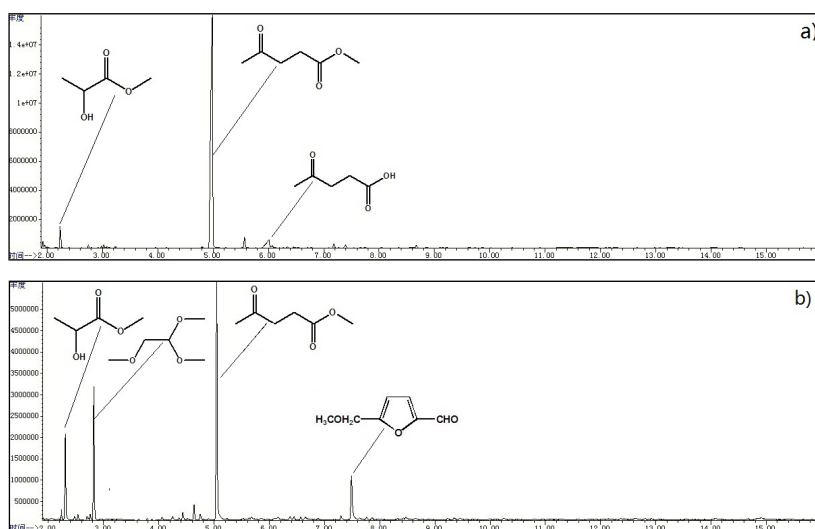


Figure S8 GC-MS spectra of reaction solution catalyzed by a) NbP-pH1 and b) NbP-pH2, reacted at 180 °C for 24h.