

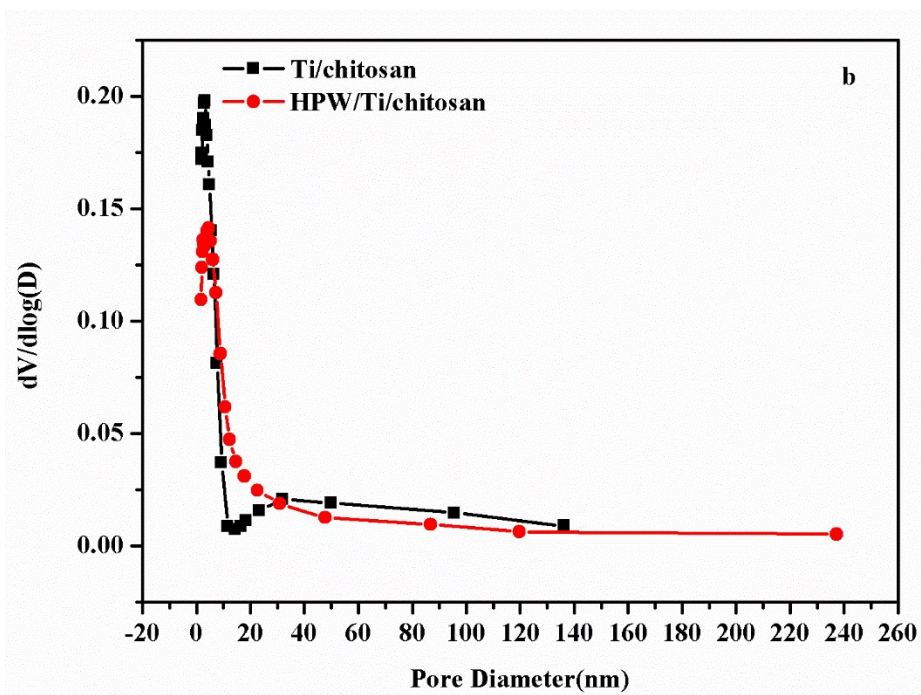
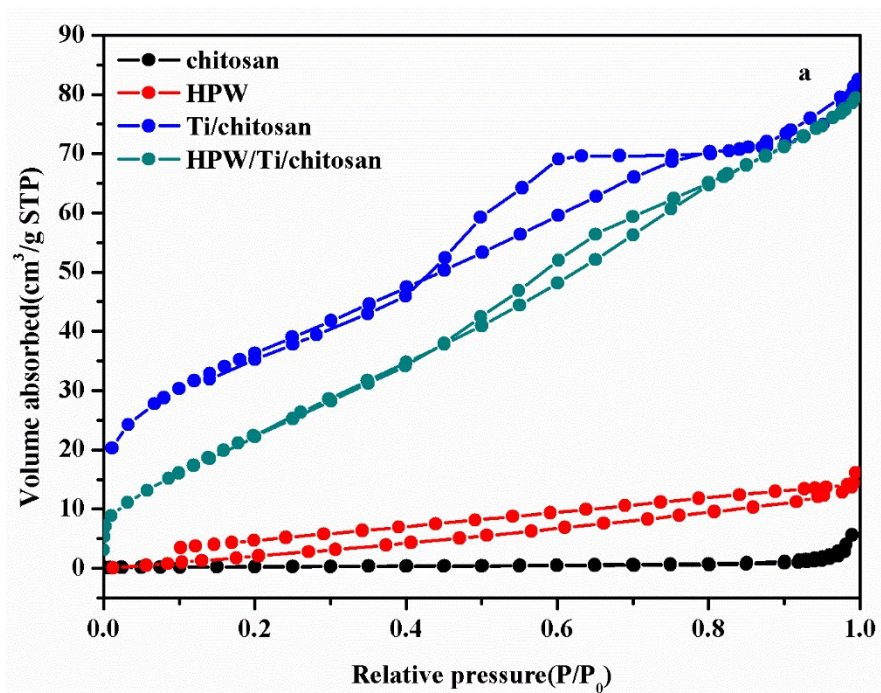
**Supporting information**

**Decoration of chitosan microspheres with Brønsted heteropolyacids and Lewis ion Ti:  
trifunctional catalysts for esterification to biodiesel**

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**Fig. S1** Nitrogen adsorption-desorption isotherms (a) and pore diameter distribution (b) of chitosan, HPW, Ti/chitosan and HPW (29 wt%)/Ti/chitosan.

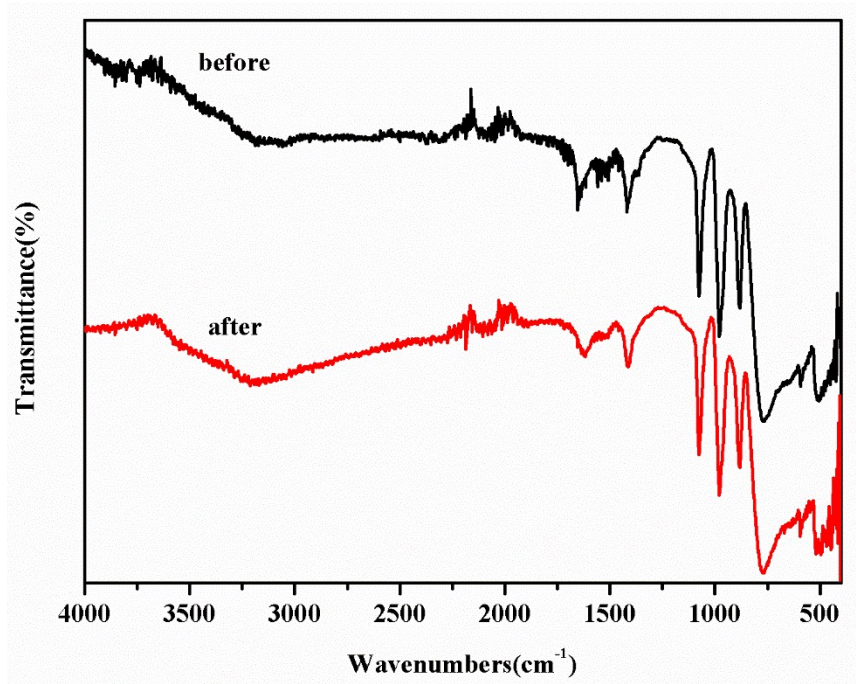
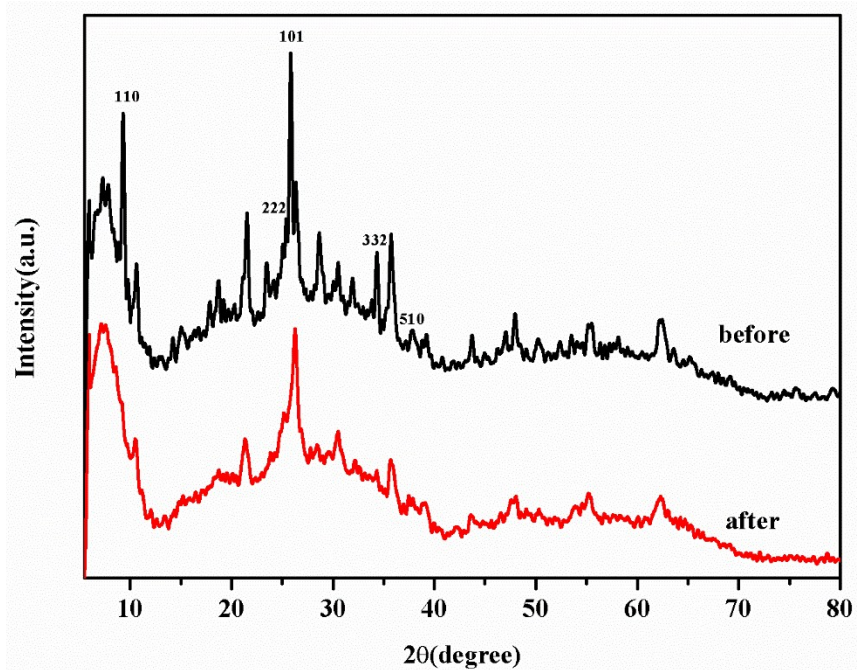
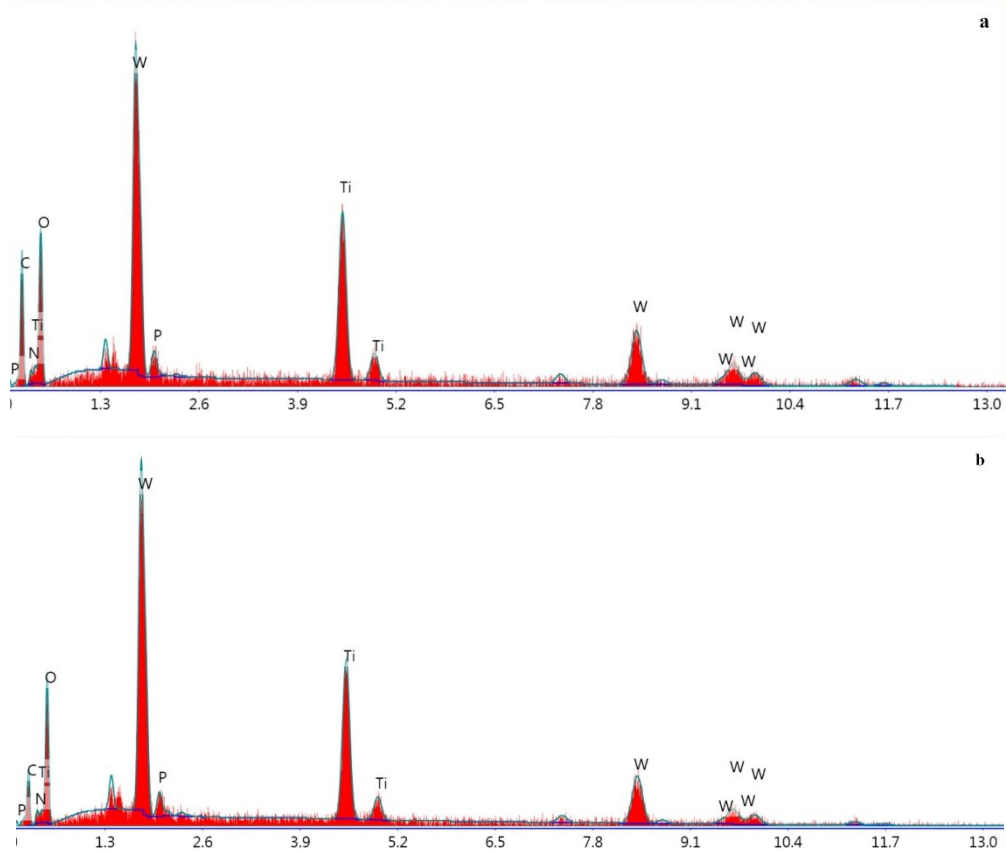


Fig. S2 IR spectra of HPW (29 wt%)/Ti/chitosan before and after reaction.



**Fig. S3** X-ray diffraction (XRD) patterns of HPW (29 wt%)/Ti/chitosan before and after reaction.



**Fig. S4** Energy Dispersive X-ray spectrometry (EDS) elemental mapping of HPW (29 wt%)/Ti/chitosan (a) before and (b) after reaction.