Electronic Supplementary Material (ESI) for New Journal of Chemistry.

Exploring and exploiting different catalytic systems for the direct conversion of cellulose into levulinic acid

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Supporting Information

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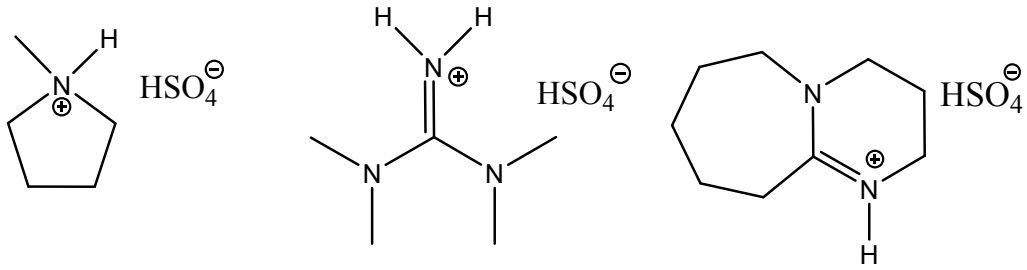

$TiOSO_4$ $FeCl_3$ $CrCl_3$

Figure S1 Catalysts tested in this work.

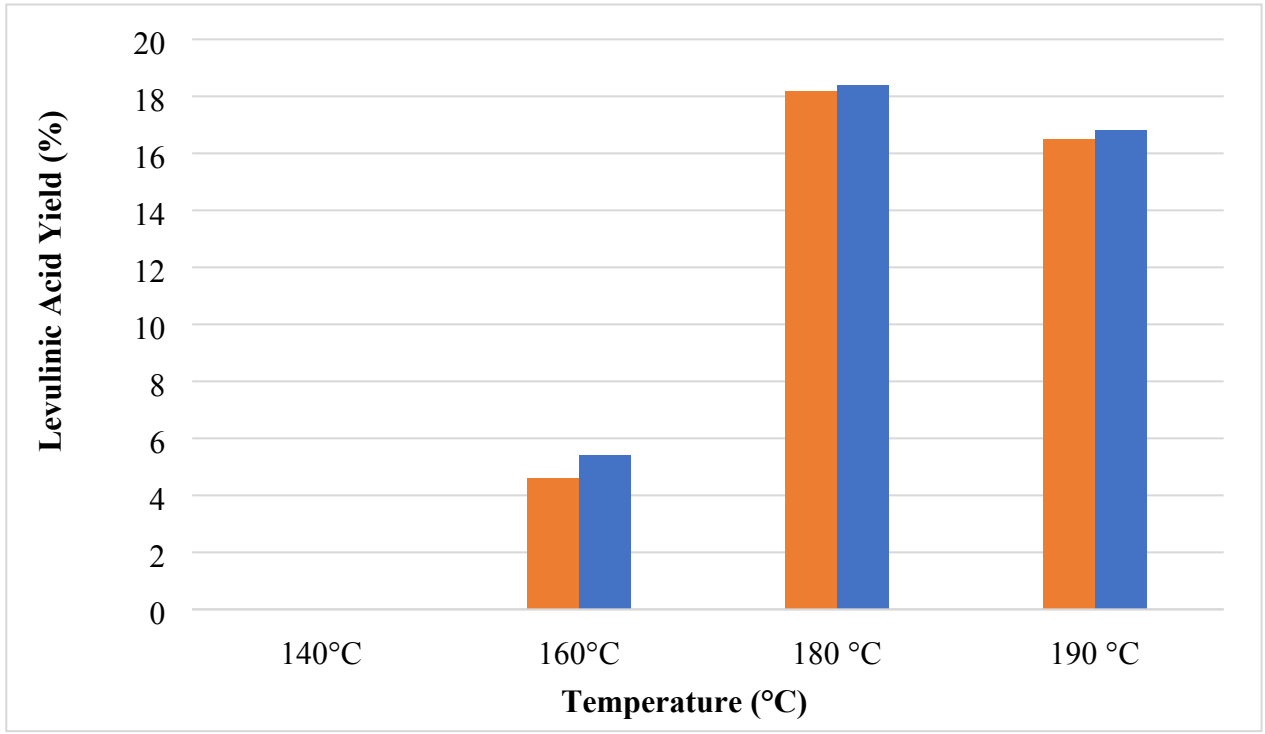

Figure S2 Effect of the temperature on LA yield (mol%). Reaction conditions: (MepyrrH)(HSO_4) 6 g, H_2O 15 g, CO_2 12 bar, 3,5 or 5 wt% MCC (red and blu, respectively), 4 h.

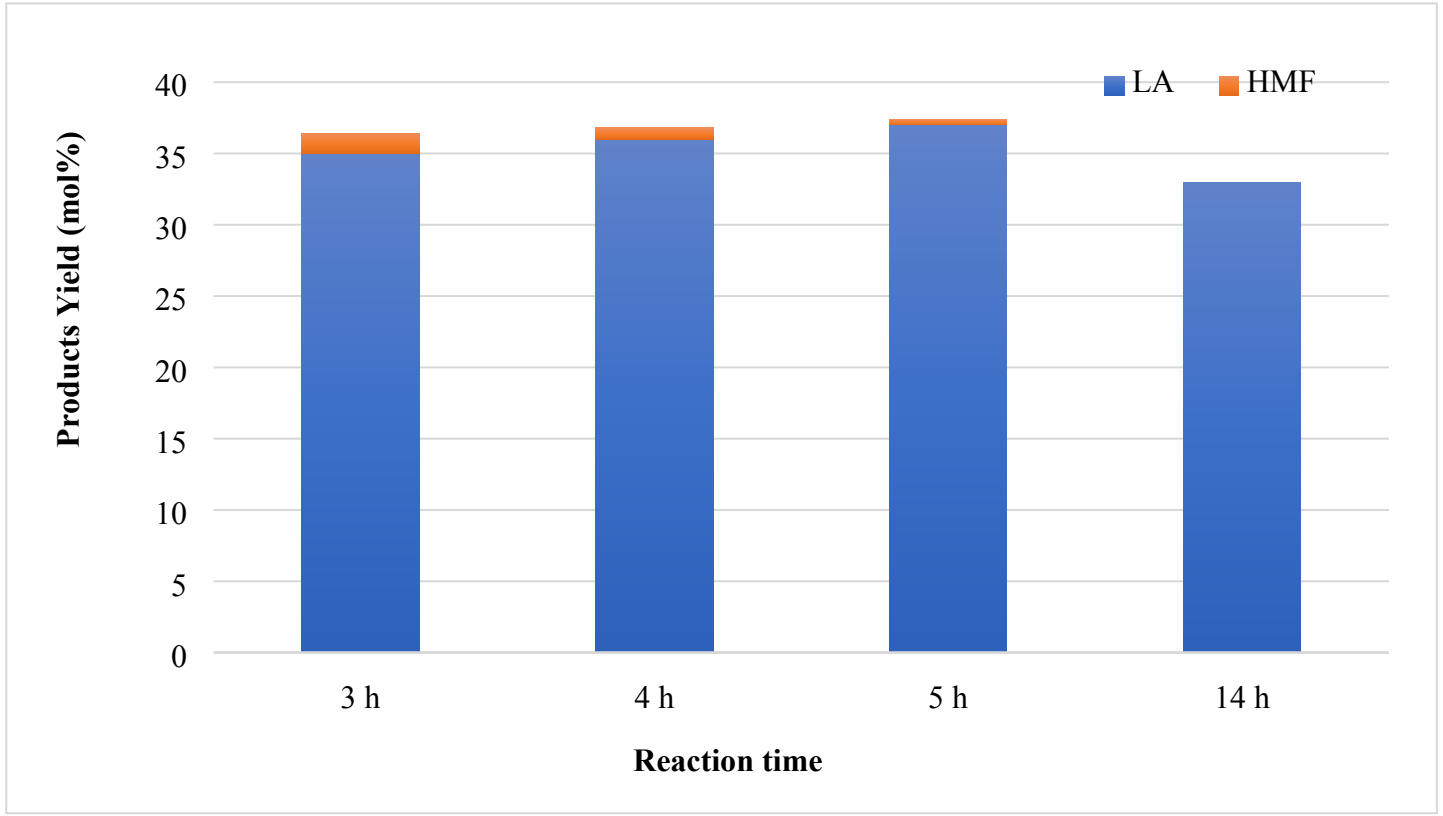

Figure S3. Effect of reaction time on LA and HMF yield (mol%). Reaction conditions: (TMGH)(HSO_4) 6 g, H_2O 15 g, CO_2 12 bar, 5 wt% MCC, 180 °C.

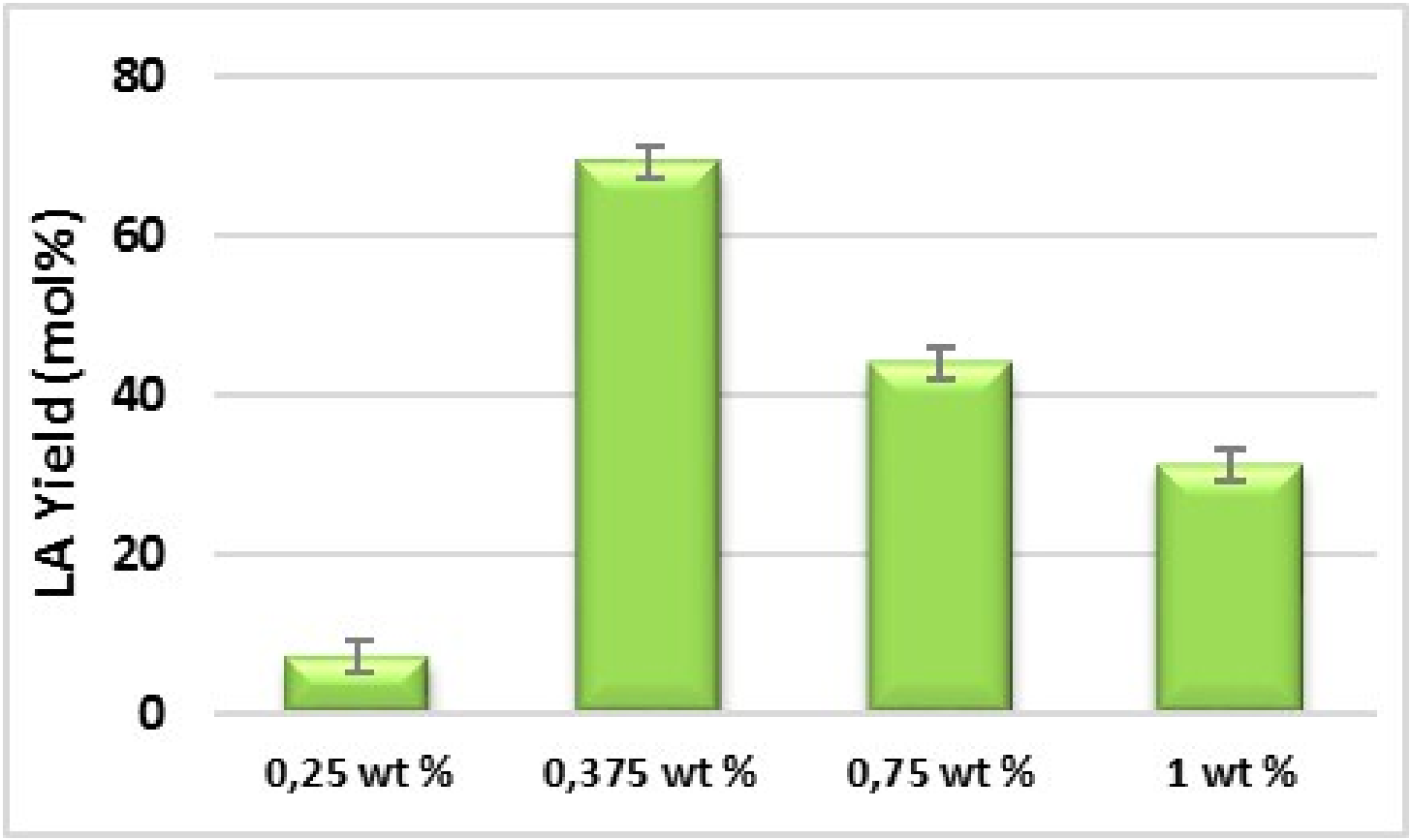

Figure S4. Effect of catalyst loading on LA yield (mol%). Reaction conditions: catalyst $TiOSO_4$, H_2O 40 mL, 2.5 wt% CFP, 195°C, 4h.

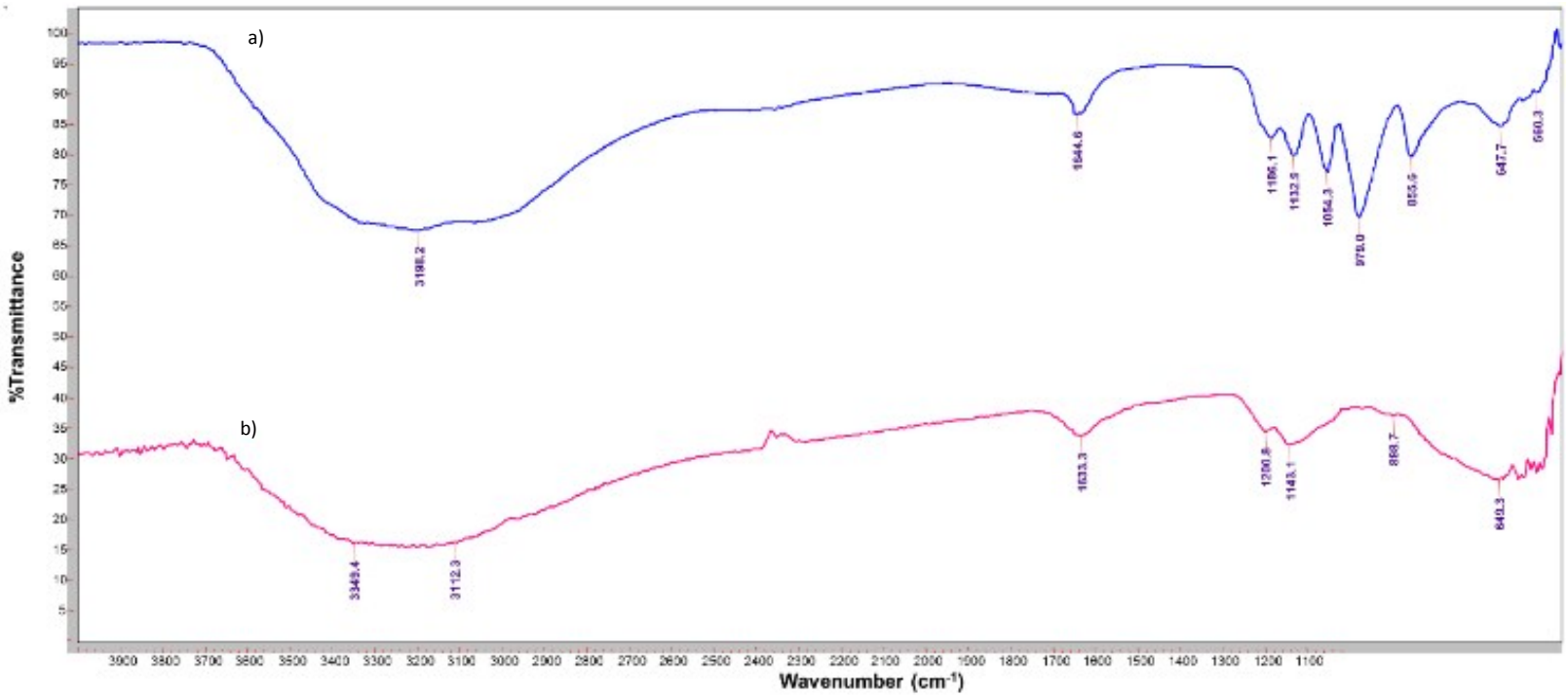

Figure S5 FTIR spectrum of a) commercial $TiOSO_4 \cdot xH_2O$ and b) hydrolyzed $TiOSO_4 \cdot xH_2O$ under reaction conditions.

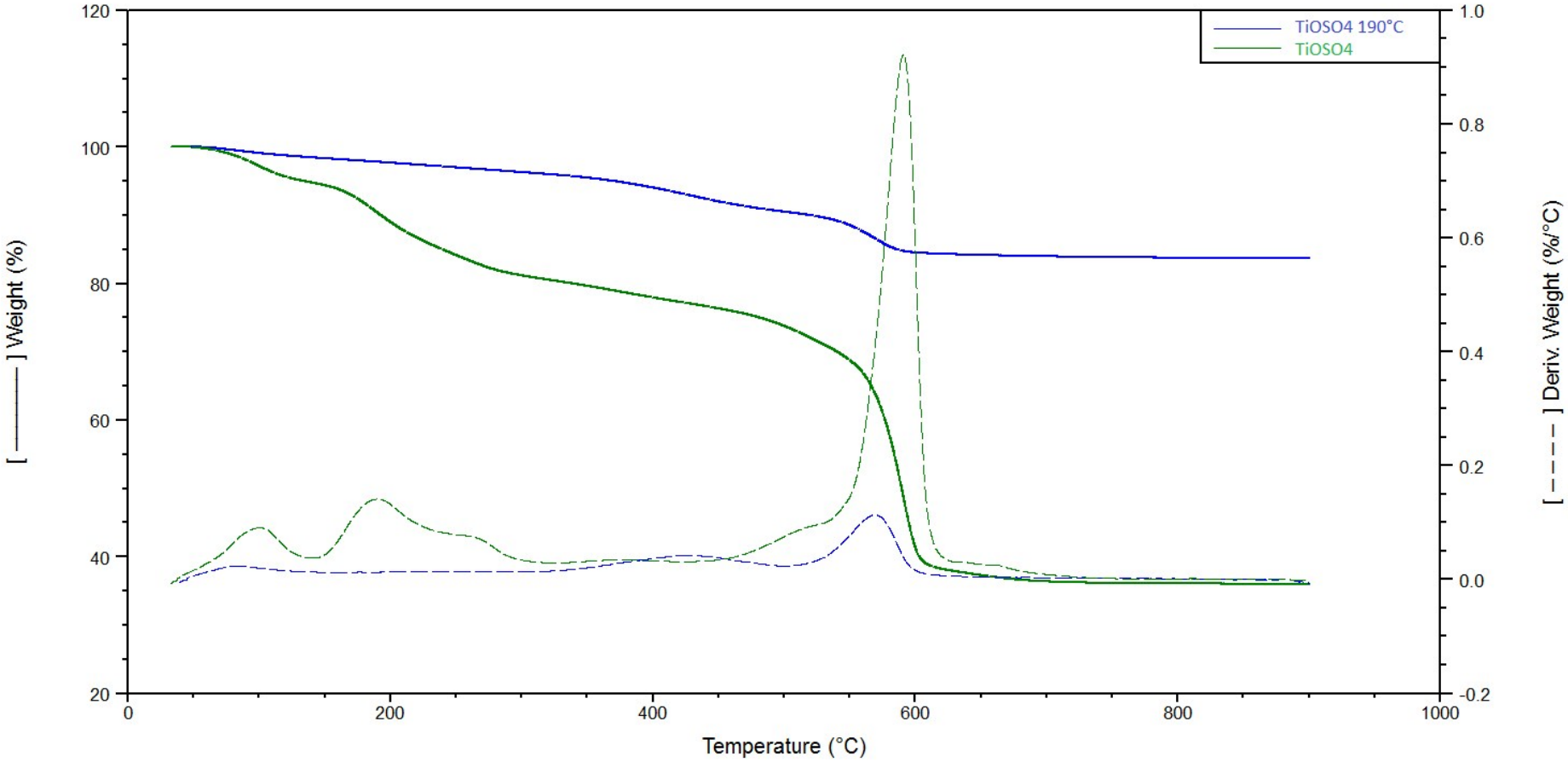

Figure S6 Thermal gravimetric analysis (TGA) of commercial $TiOSO_4 \cdot xH_2O$ and hydrolyzed $TiOSO_4 \cdot xH_2O$.

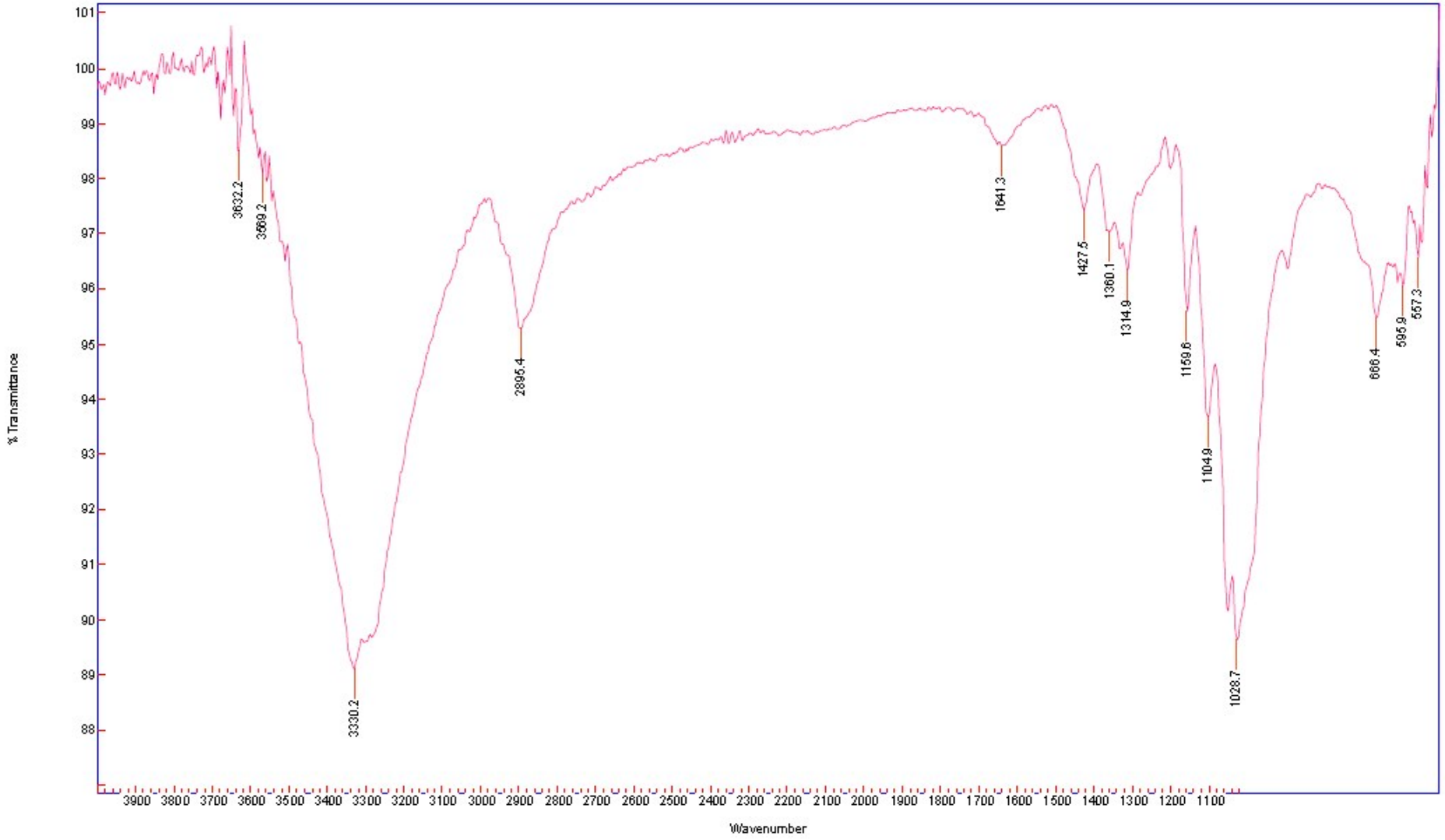

Figure S7 IR spectra of MCC

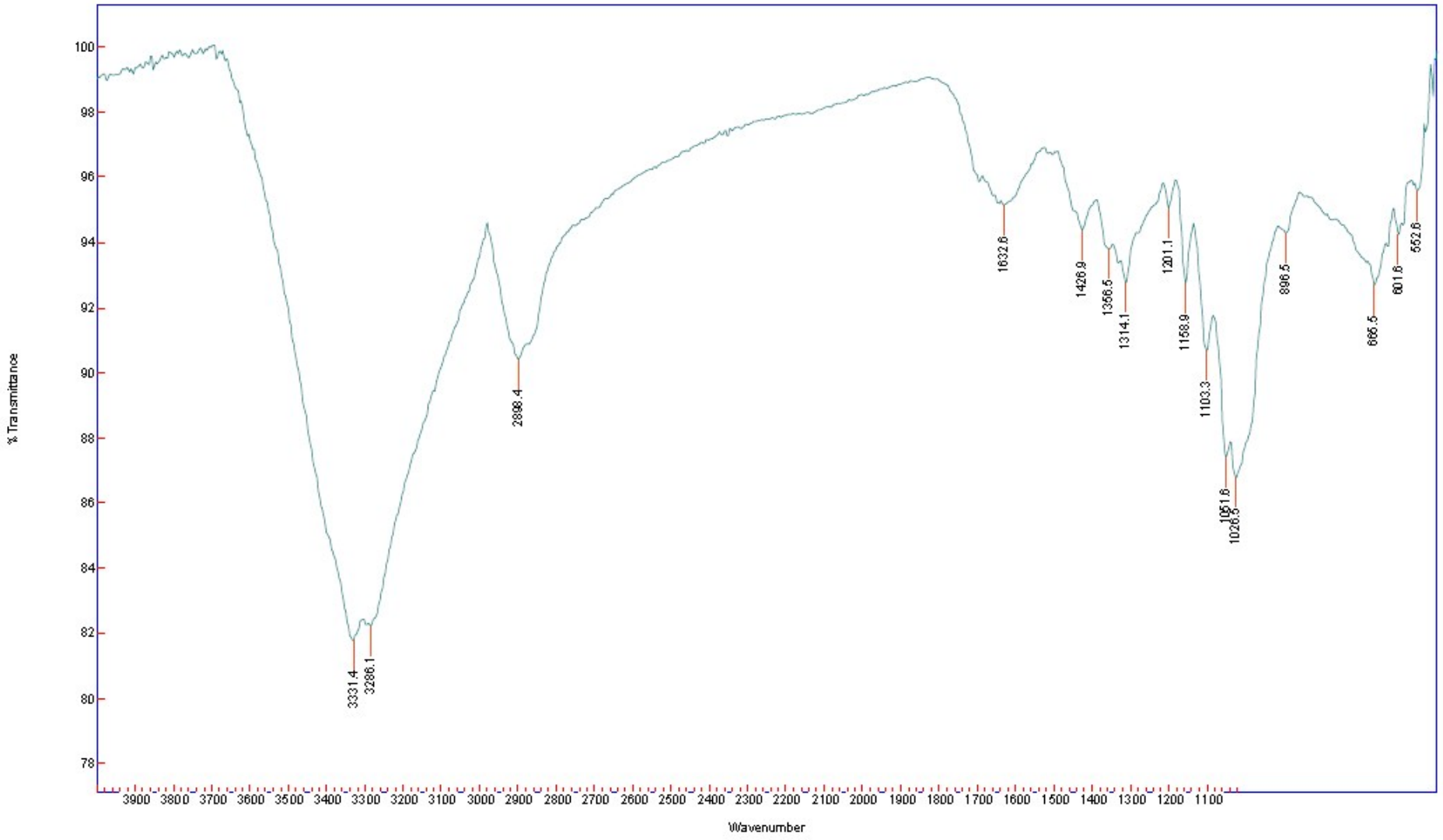

Figure S8 IR spectra of unreacted cellulose

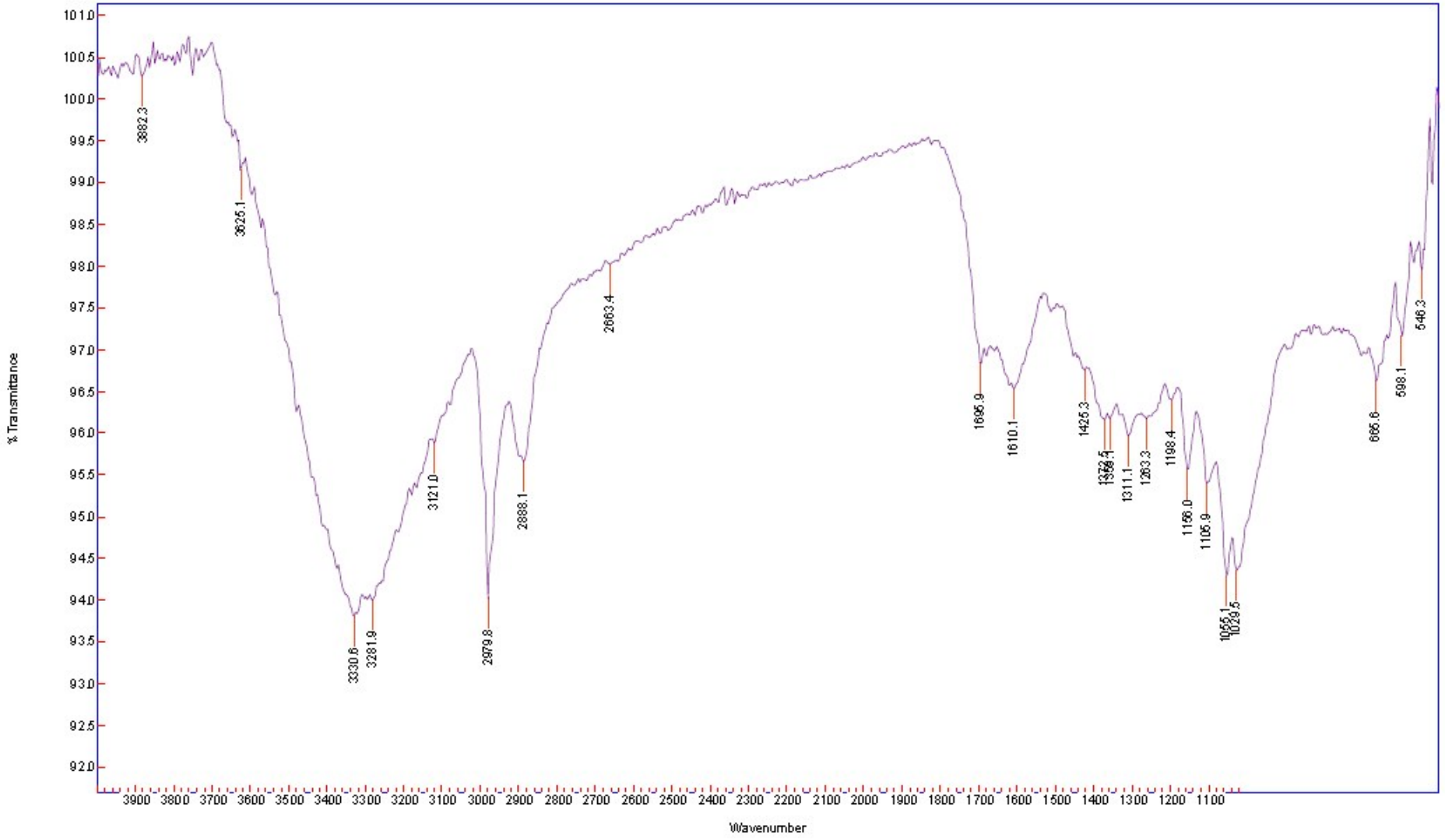

Figure S9 IR spectra of mixture metals derived Humins/unreacted cellulose

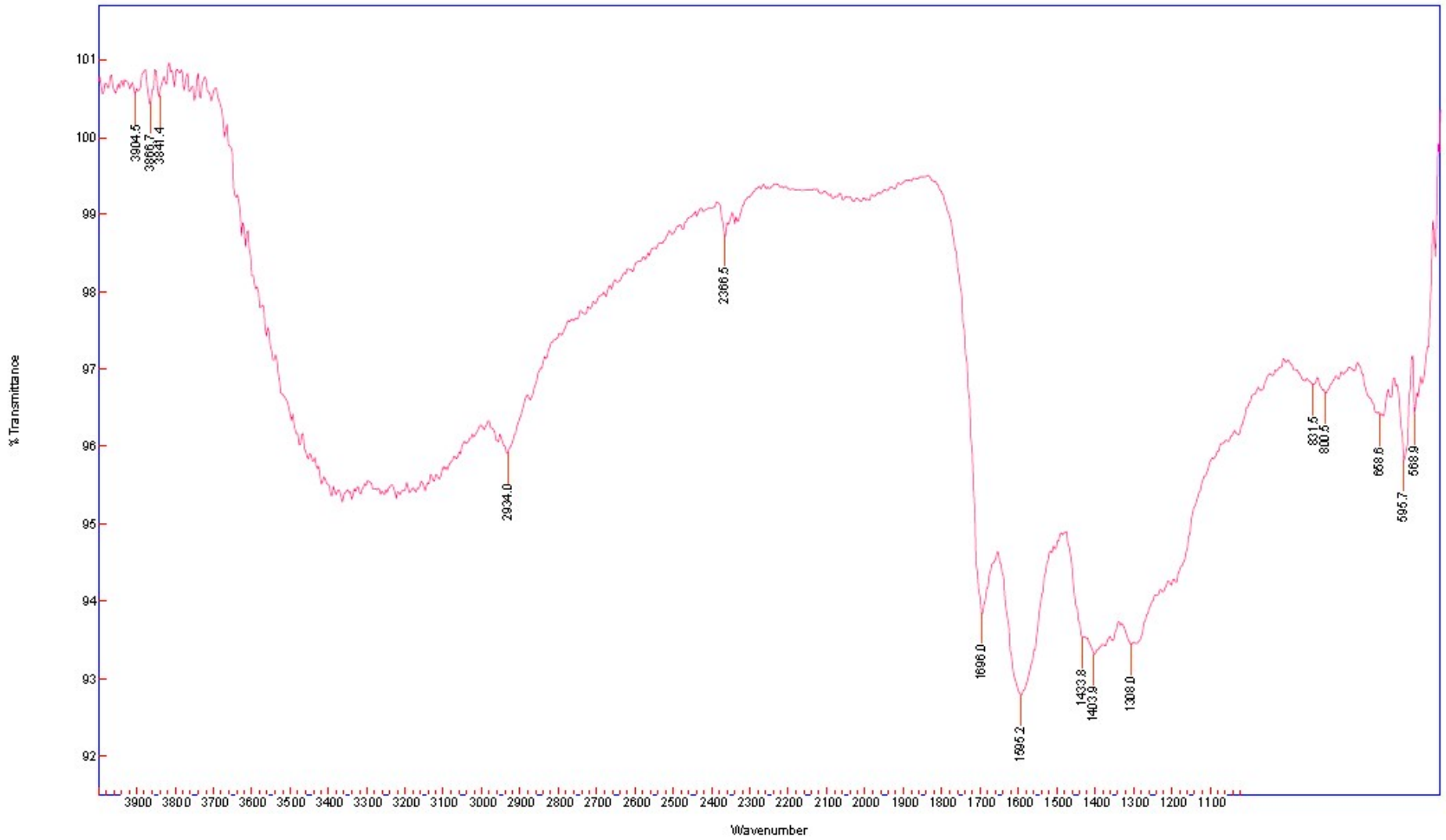

Figure S10 IR spectra of mixture metals derived Humins

Figure S11 IR spectra of ILs derived Humins.