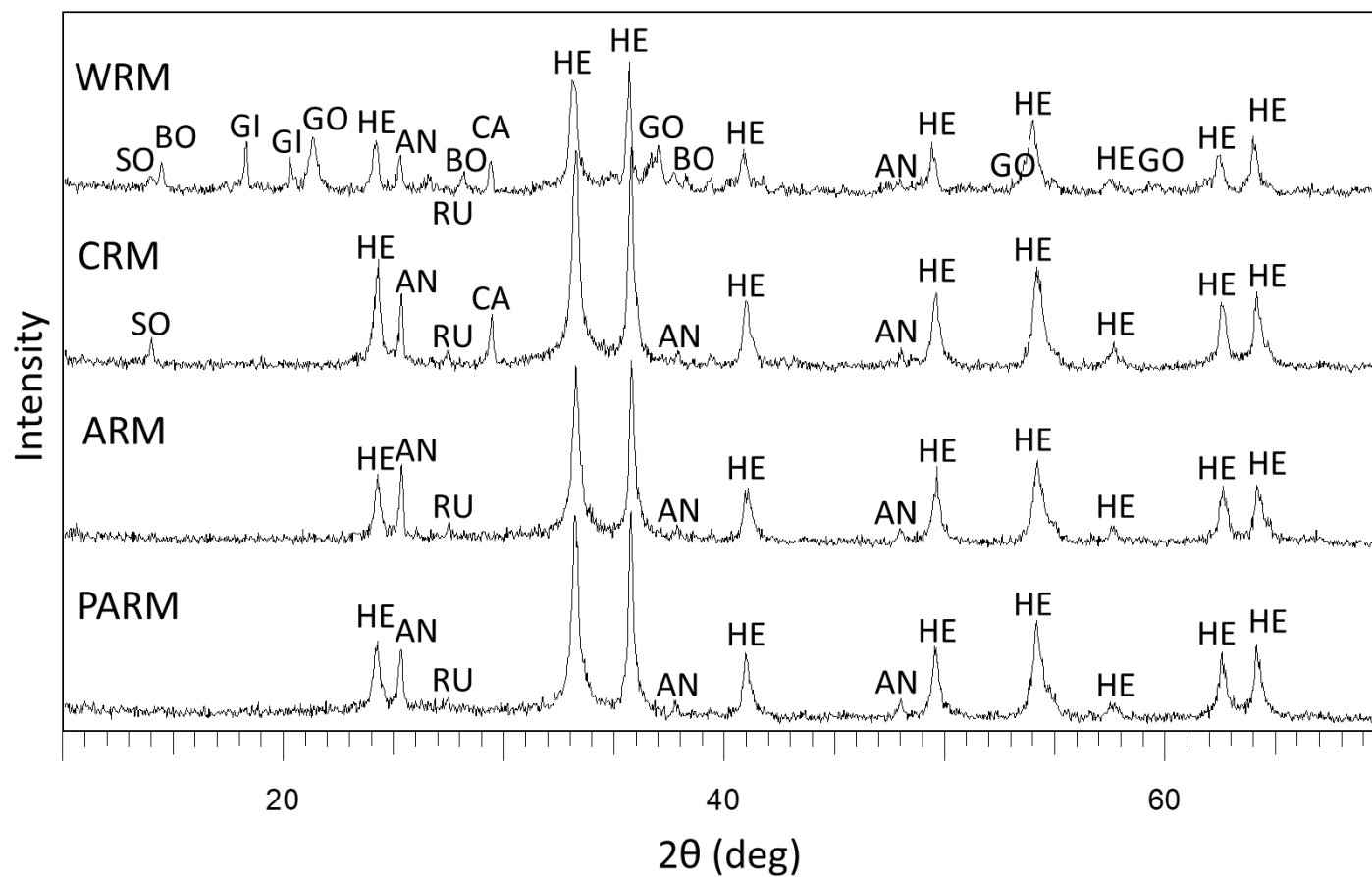
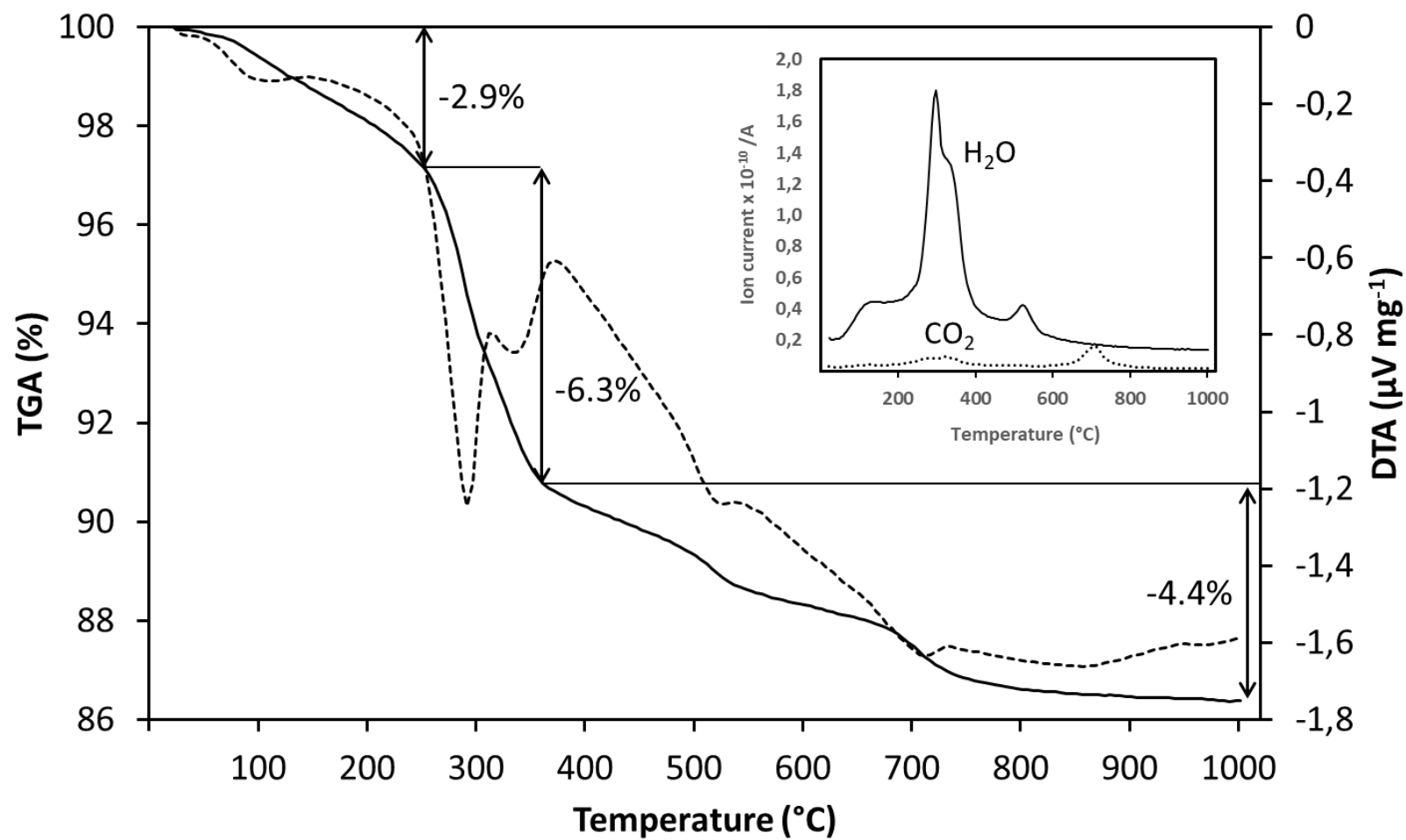


**Figure S1.** XRD patterns of WRM (washed RM), CRM (calcined RM), ARM (HCl-activated RM) and PARM (HCl + H<sub>3</sub>PO<sub>4</sub> -activated RM).

Hematite HE, anatase AN, rutile RU, gibbsite GI, boehmite BO, goethite GO, calcite CA and sodium aluminum silicate hydroxide hydrate SO are presented in the figure.

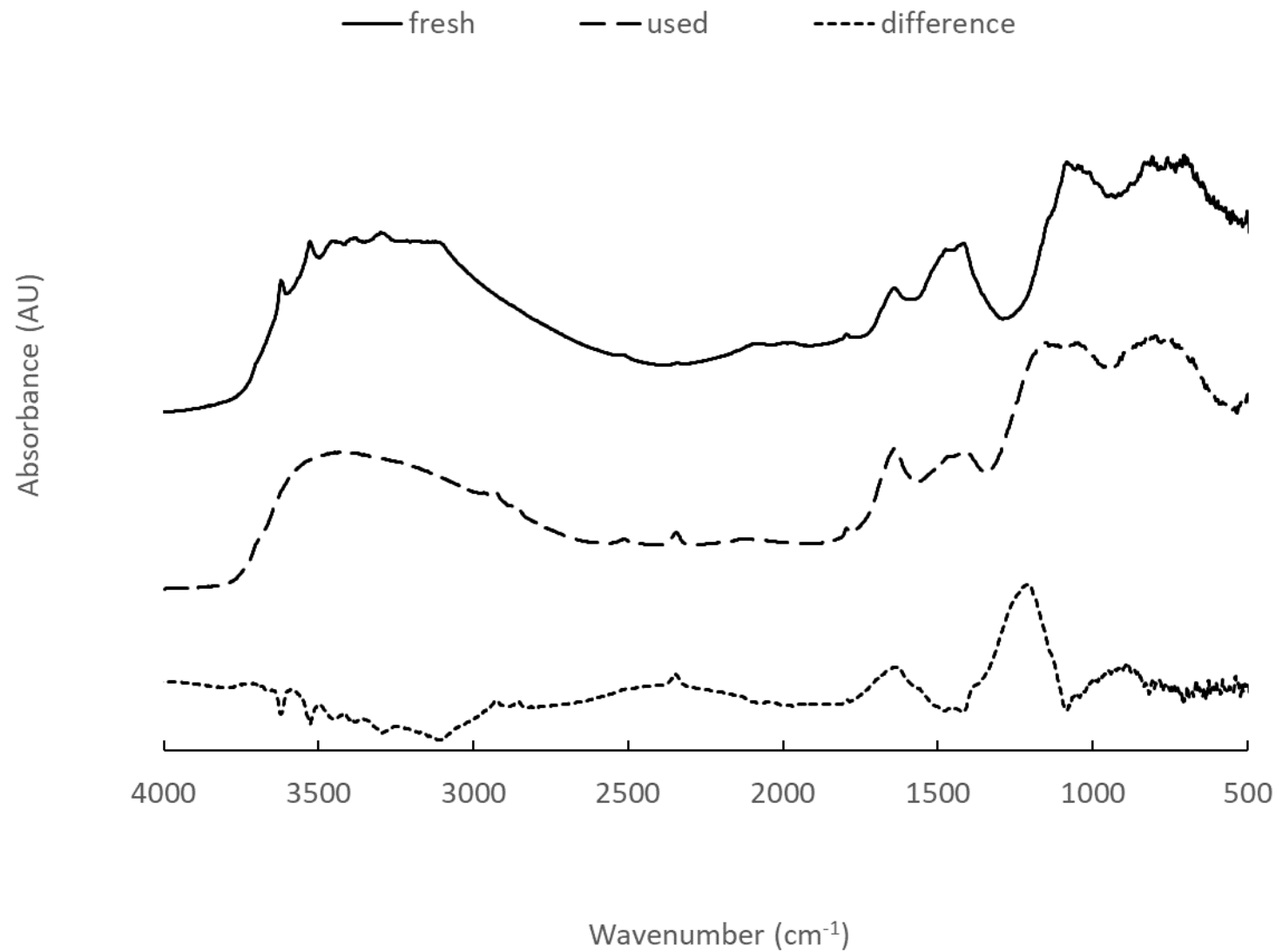


**Figure S2.** Thermogravimetric analysis (TGA) and differential thermal analysis (DTA) of WRM (washed RM) and formation of H<sub>2</sub>O and CO<sub>2</sub> during the analysis measured with mass spectrometry.

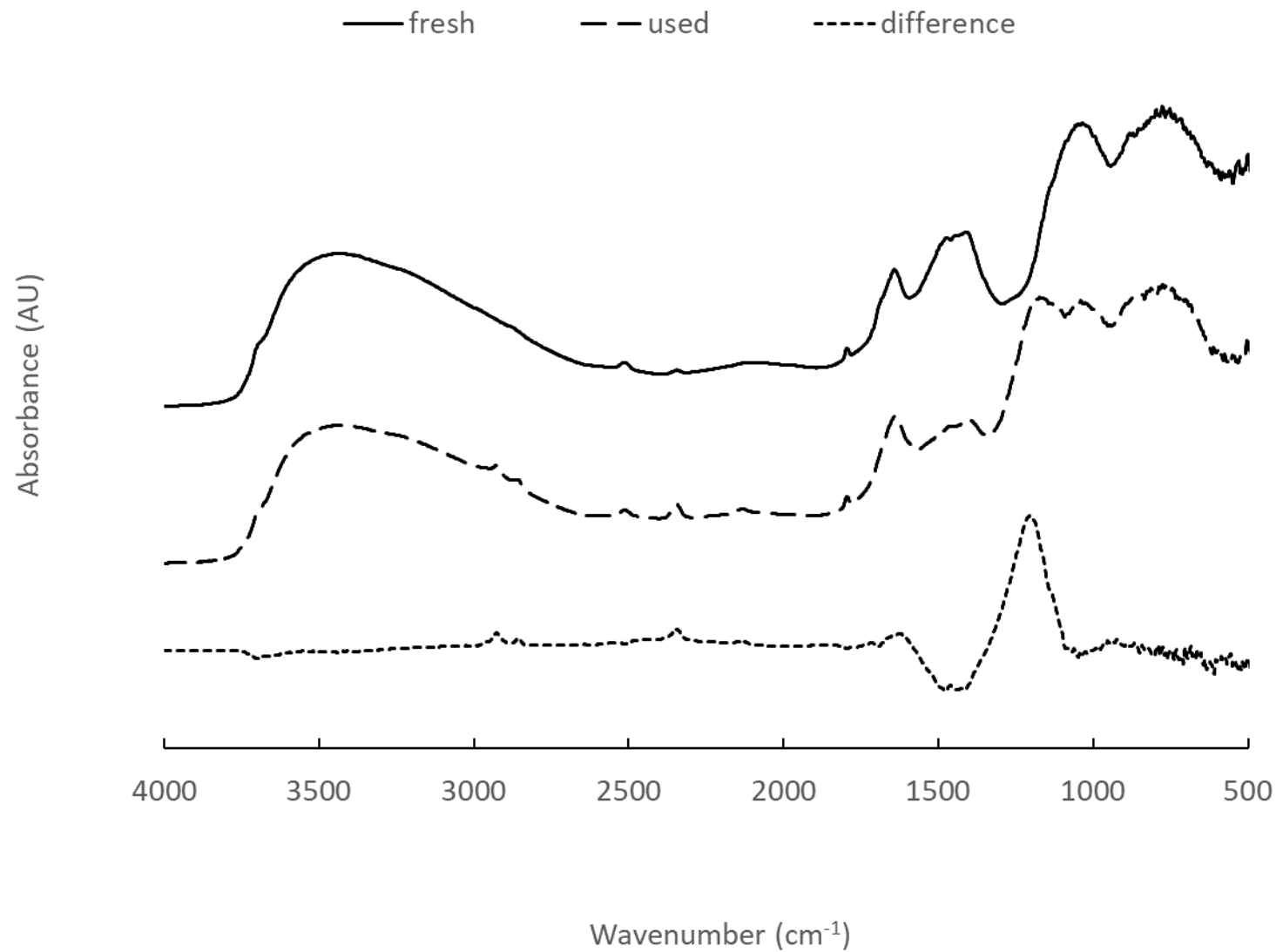


**Figures S3-S11.** The DRIFT spectra for all DMDS and MM experiments are presented below. For each experiment, spectra for fresh and used RM sample are presented, in addition to the difference spectrum representing the adsorption on the material during the experiment (WRM: washed RM, CRM: calcined RM, ARM: HCl-activated RM, PARM: HCl + H<sub>3</sub>PO<sub>4</sub> -activated RM).

# WRM 0.30 g (DMDS 55 ppm)



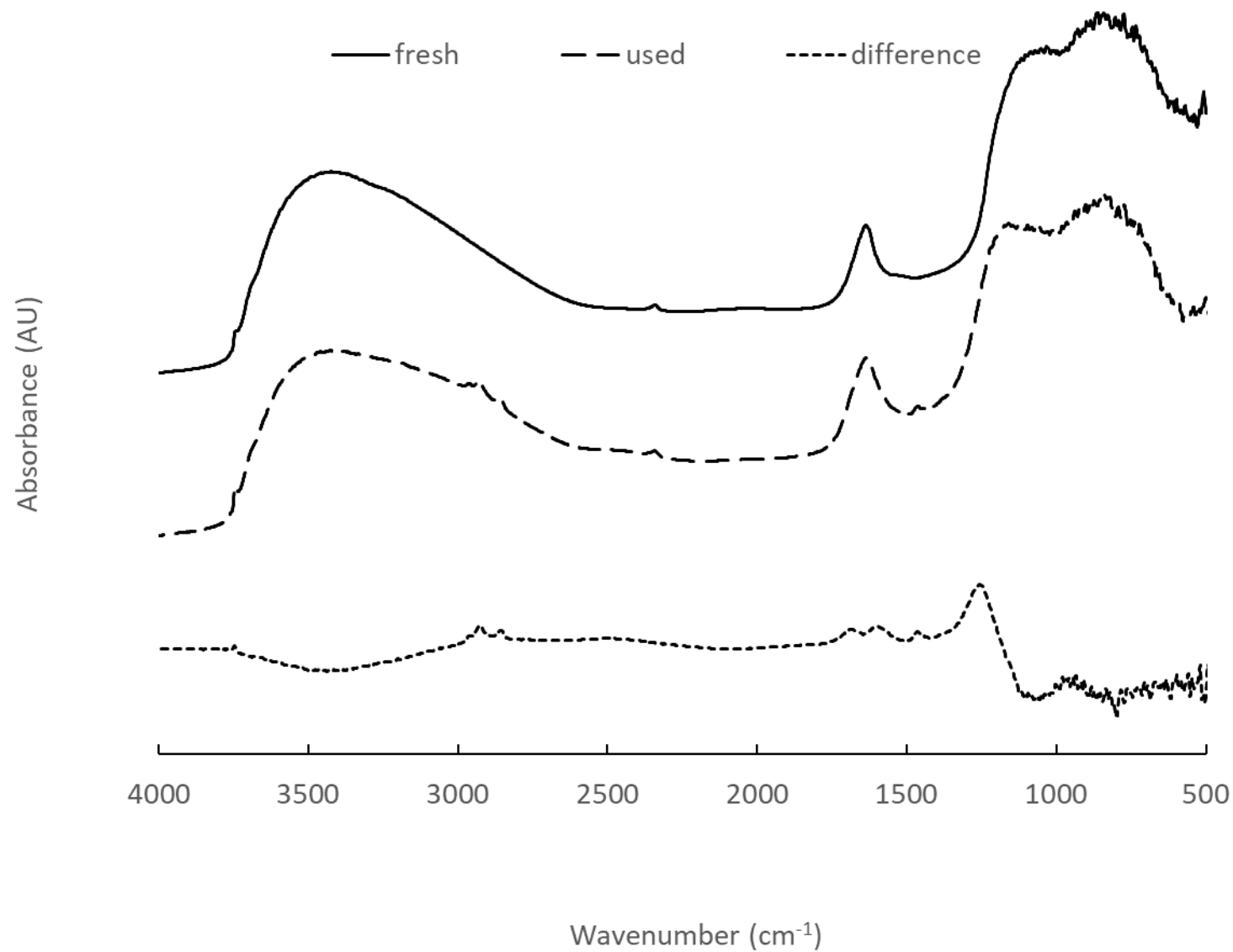
# CRM 0.30 g (DMDS 55 ppm)



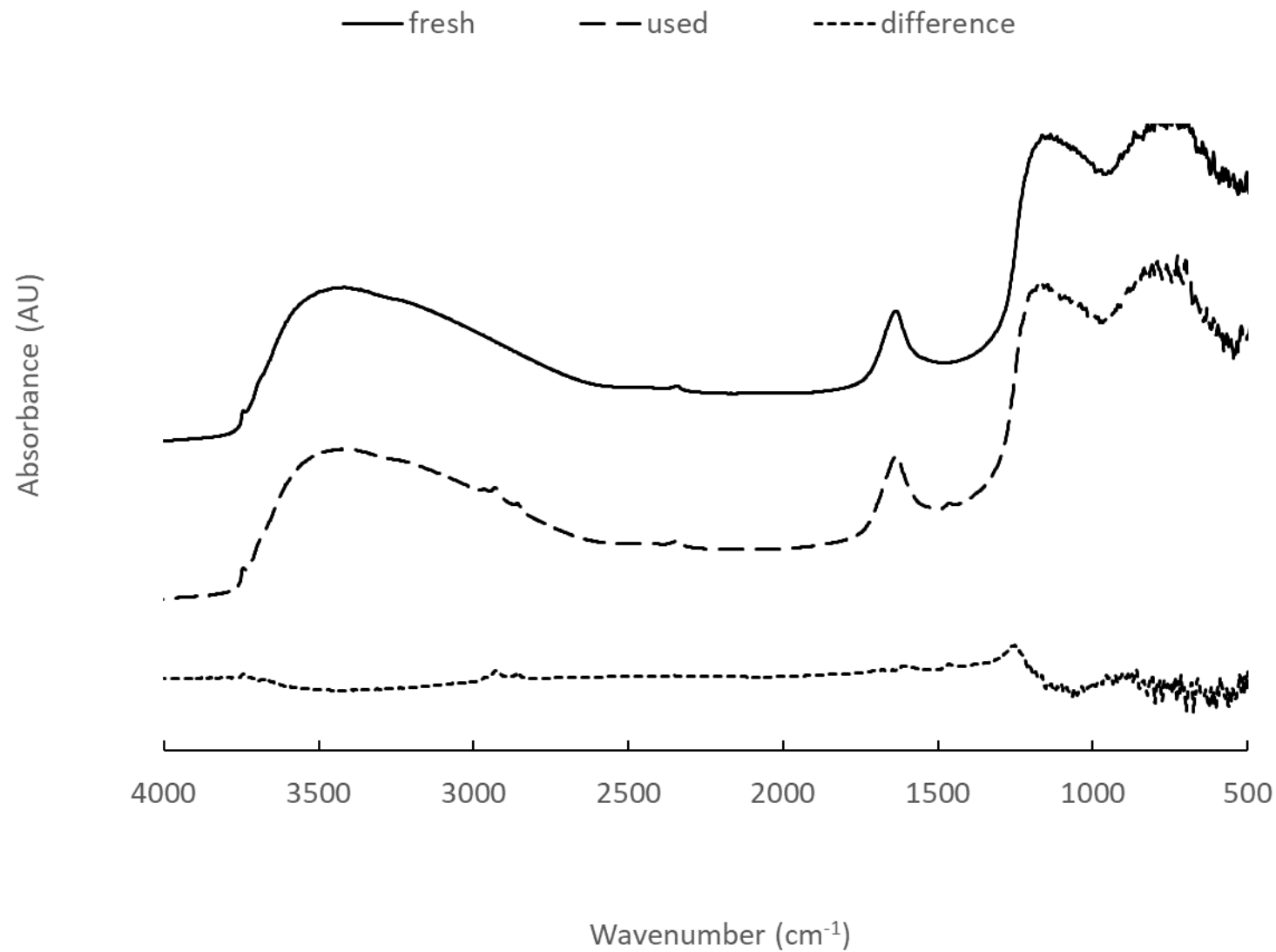
# ARM 0.15 g (DMDS 55 ppm)



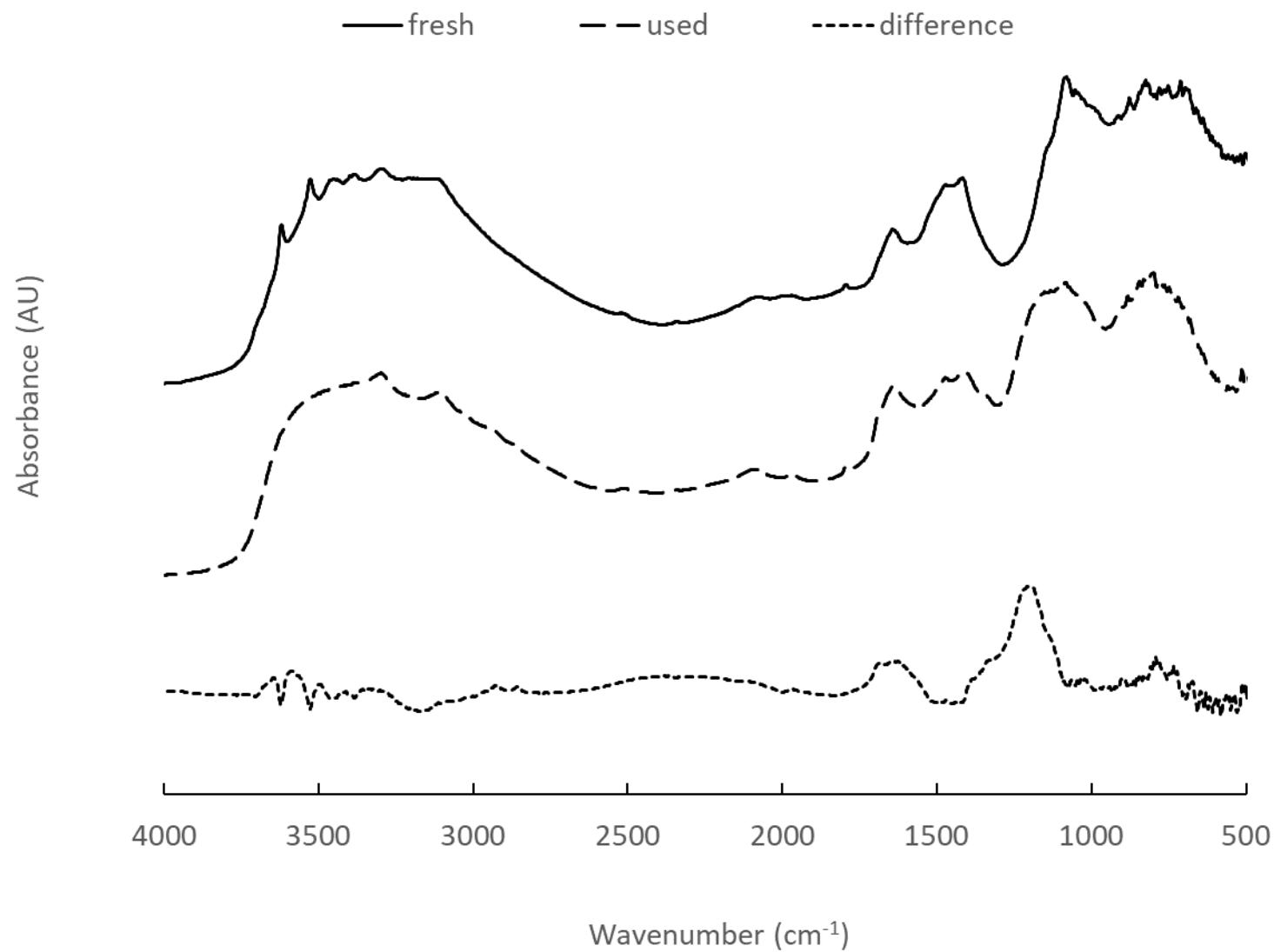
# ARM 0.15 g (DMDS 110 ppm)



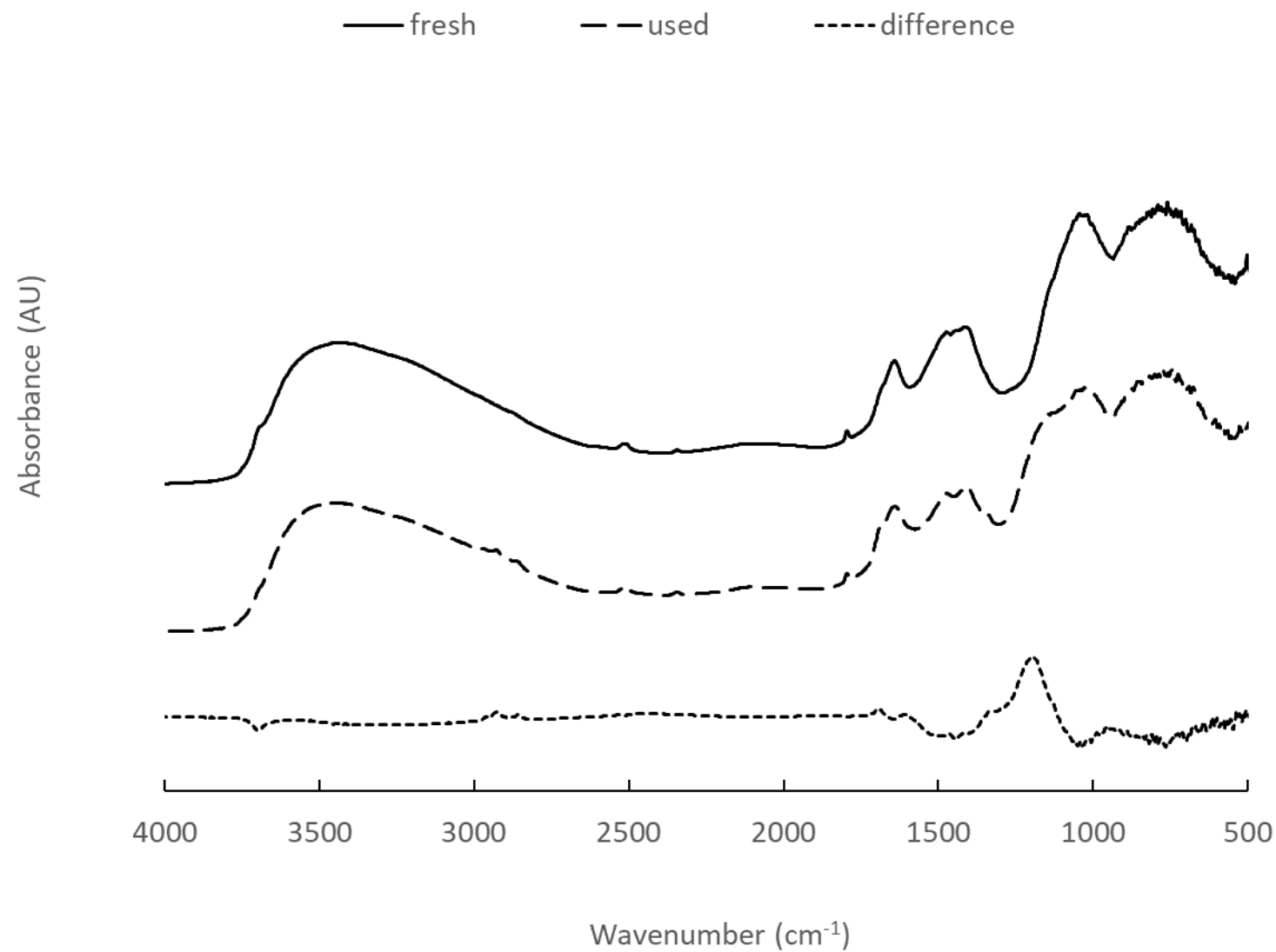
# PARM 0.15 g (DMDS 55 ppm)



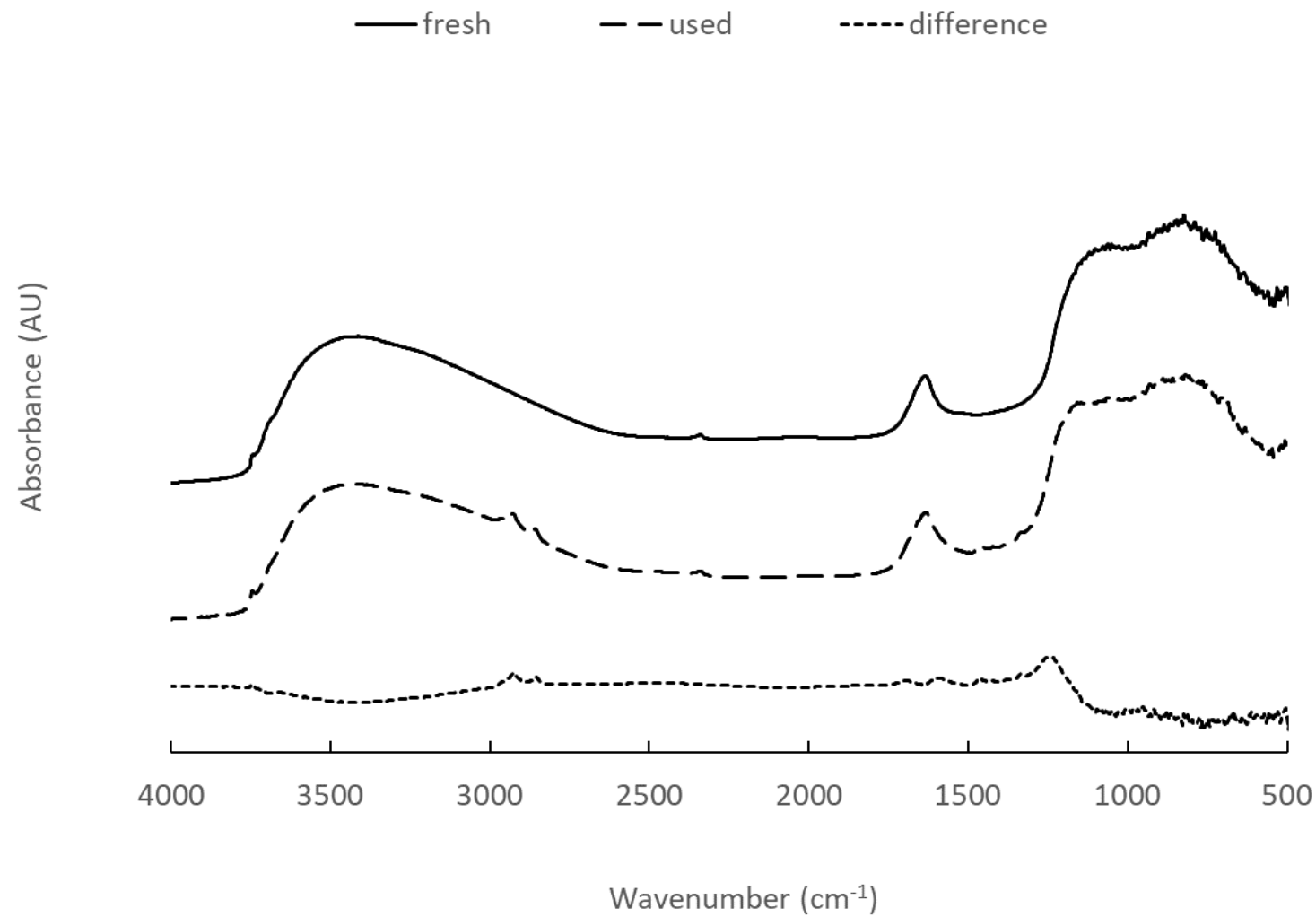
# WRM 0.15 g (MM 120 ppm)



# CRM 0.15 g (MM 120 ppm)



# ARM 0.15 g (MM 120 ppm)



# PARM 0.15 g (MM 120 ppm)

