# ELETRONIC SUPORTING INFORMATION FOR

# $TiO_2$ Nanoparticles Coated with Deep Eutectic Solvents: Characterization and Effect on Photodegradation of Organic Dyes

*Bruna L. Kuhn*[†], *G. C. Paveglio*[†], *Siara Silvestri*[‡], *Edson I. Muller*[†], *Michele S. P. Enders*[†], *Marcos A. P. Martins*[†], *Nilo Zanatta*[†], *Hélio G. Bonacorso*[†], Claúdio Radke[§] and *Clarissa P. Frizzo*[†]*

[†] Department of Chemistry, Federal University of Santa Maria (UFSM), CEP 97105-900, Santa Maria, RS, Brazil

[‡]Laboratório de Tecnologia de Materiais (LABTM), Department of Chemical Engineering, Federal University of Santa Maria, 97105–900 Santa Maria, Brazil.

[§]Instituto de Química, Universidade Federal do Rio Grande do Sul, Avenida Bento Gonçalves, 9500, 91501-970, Porto Alegre, RS, Brazil

Corresponding Author

*Corresponding author. Tel.: +55 5532208756.

E-mail address: clarissa.frizzo@gmail.com (C.P. Frizzo).

Number of pages: 32

Number of Figures: 54

## Table of Contents

# THERMOGRAVIMETRIC ANALISYS

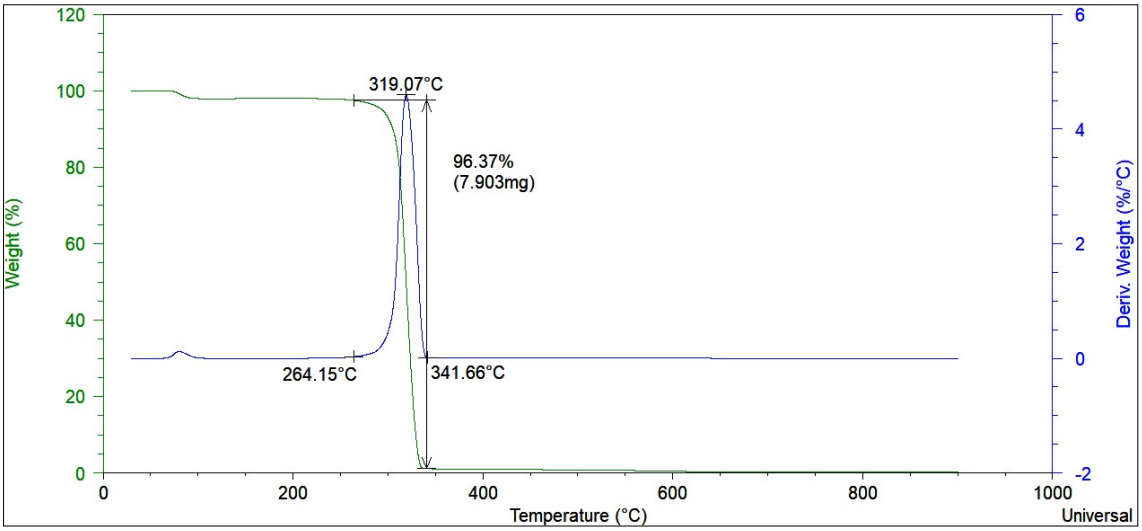


**Figure S1**. TGA of choline chloride.

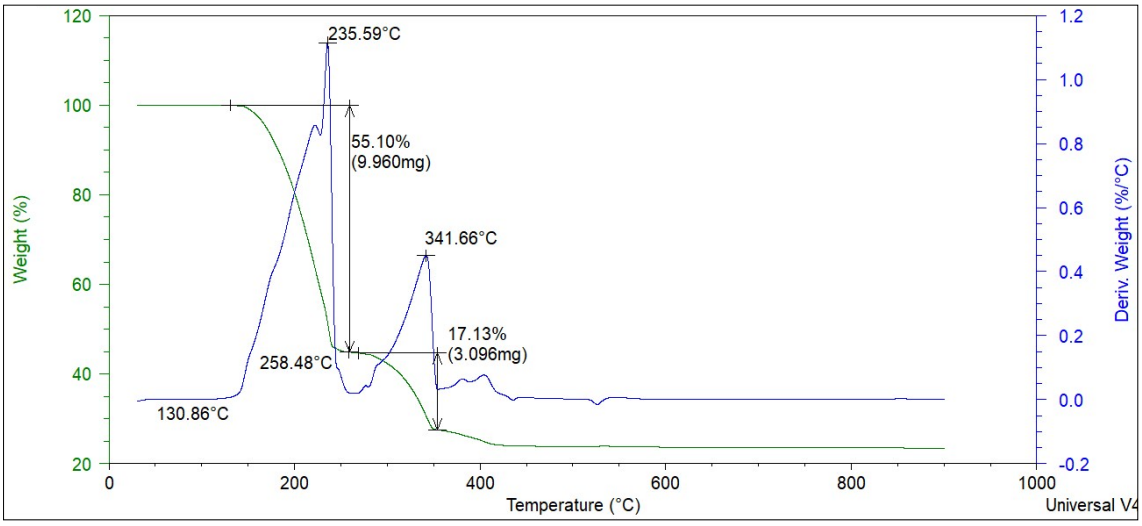


**Figure S2**. TGA of urea.

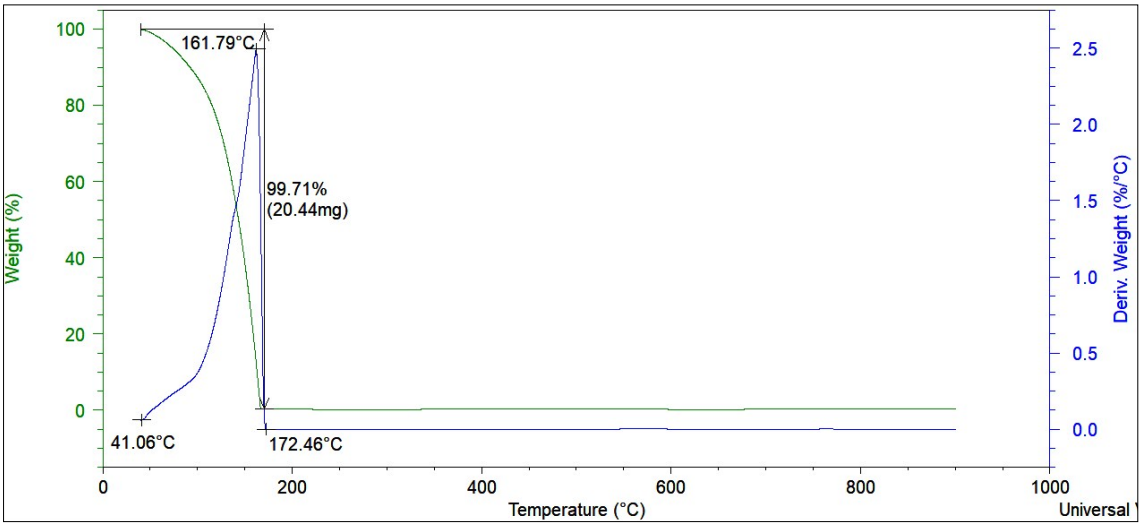


**Figure S3**. TGA of ethyleneglycol.

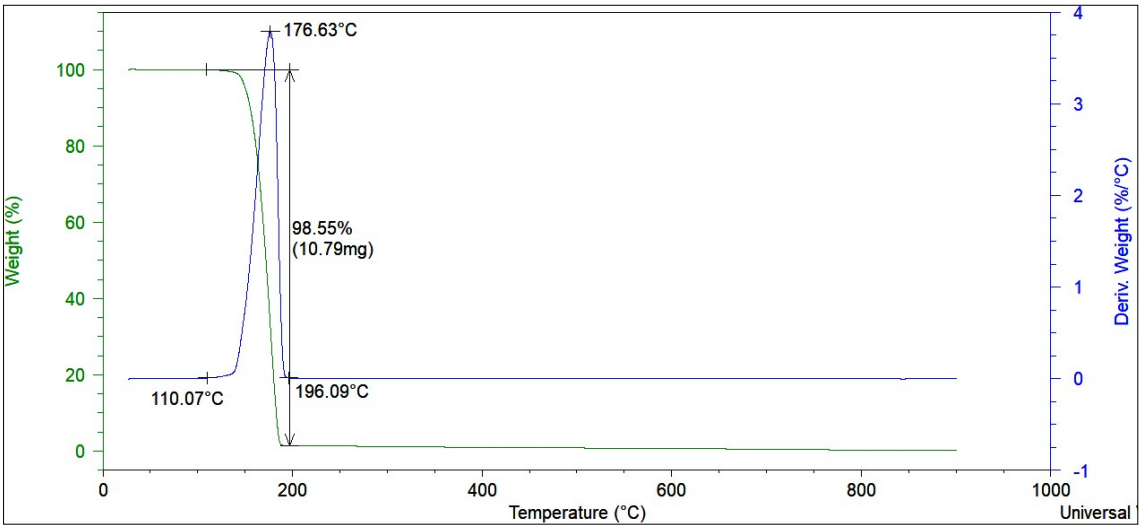


**Figure S4**. TGA of malonic acid.

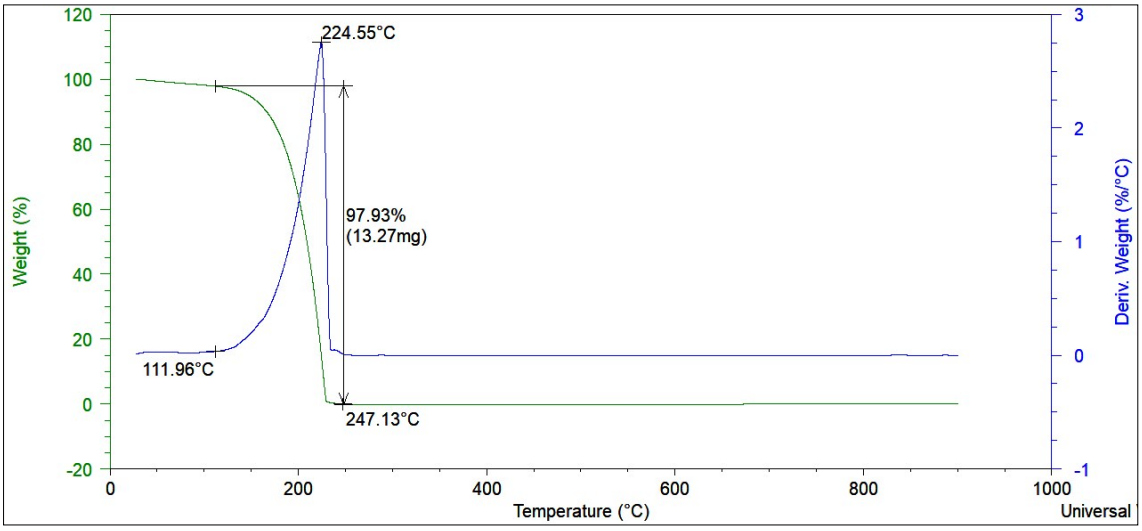


**Figure S5**. TGA of glycerol.

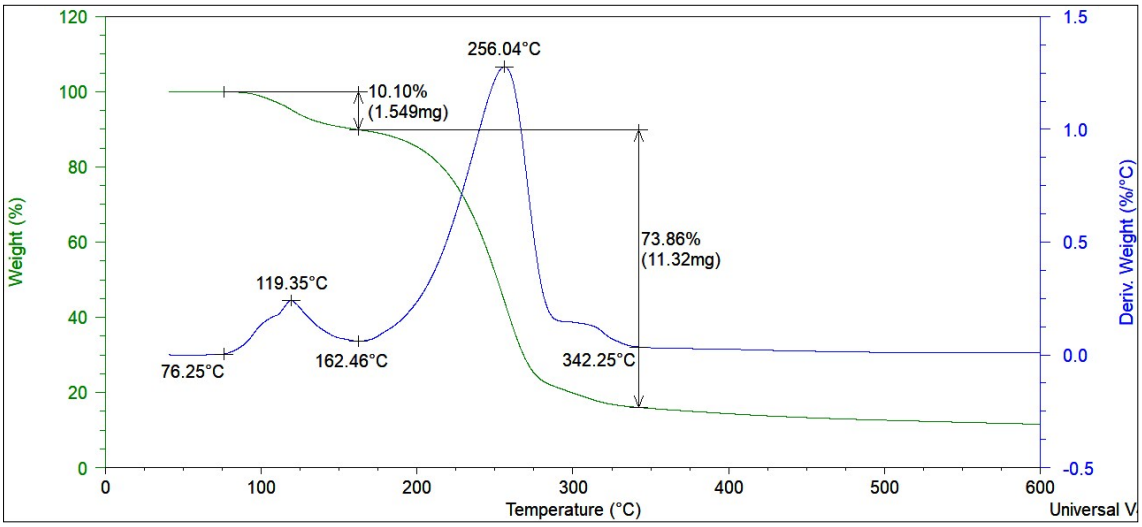


**Figure S3**. TGA of toluene sulphonic acid.

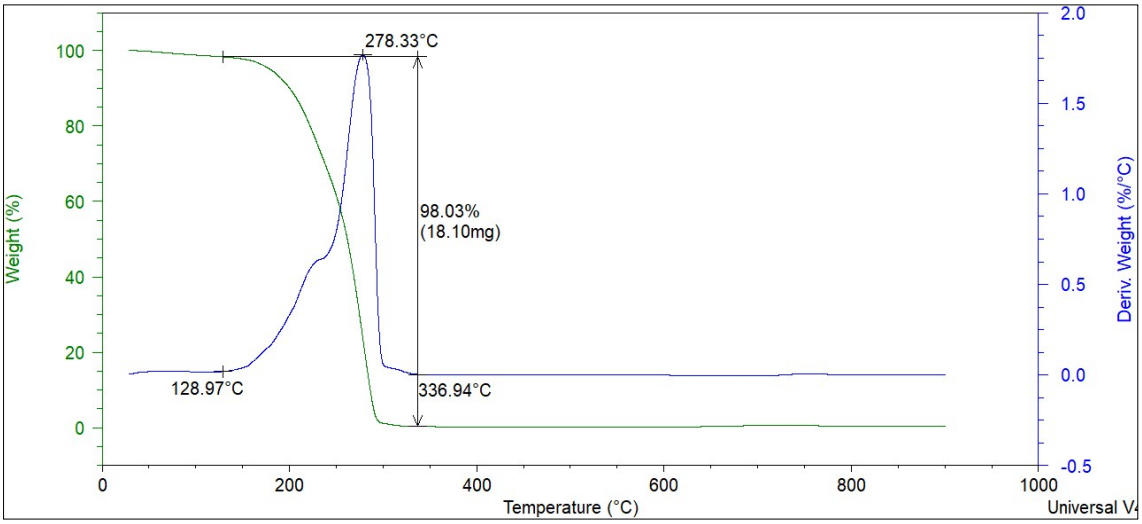


**Figure S7**. TGA of ChCl:Urea (1:2).

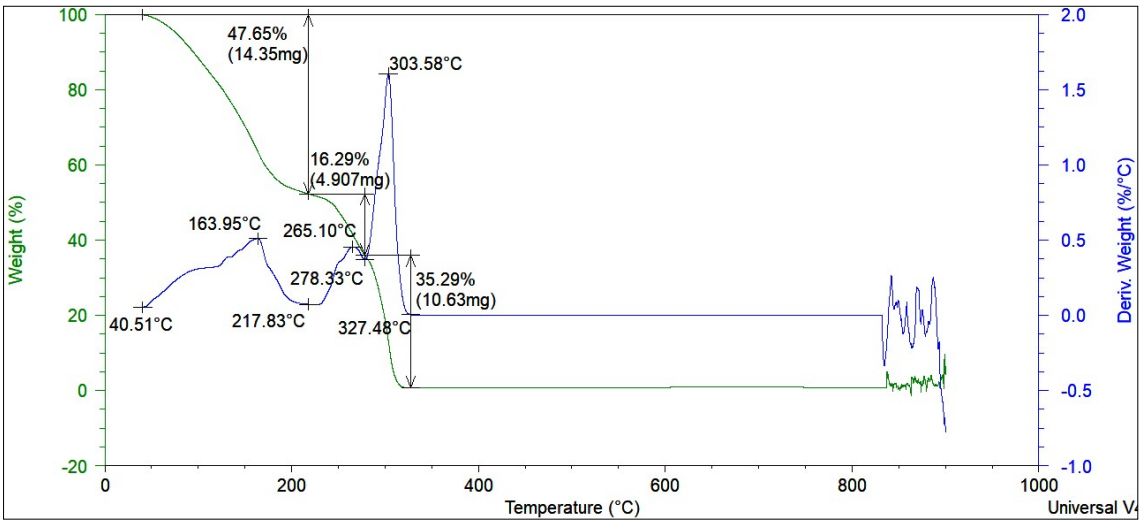


**Figure S8**. TGA of ChCl:Ethyleneglycol (1:1).

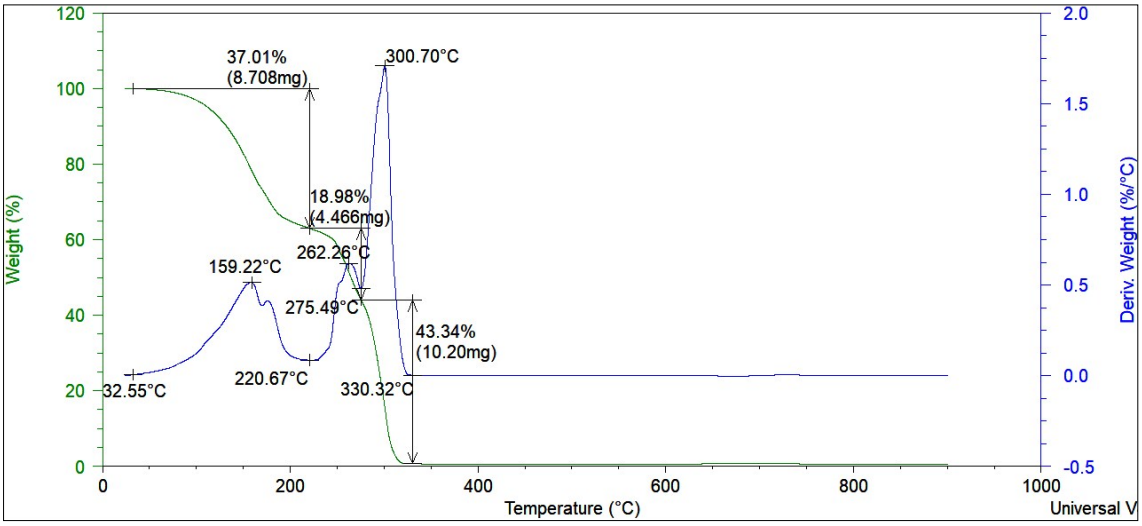


**Figure S9**. TGA of ChCl:Ethyleneglycol (1:2).

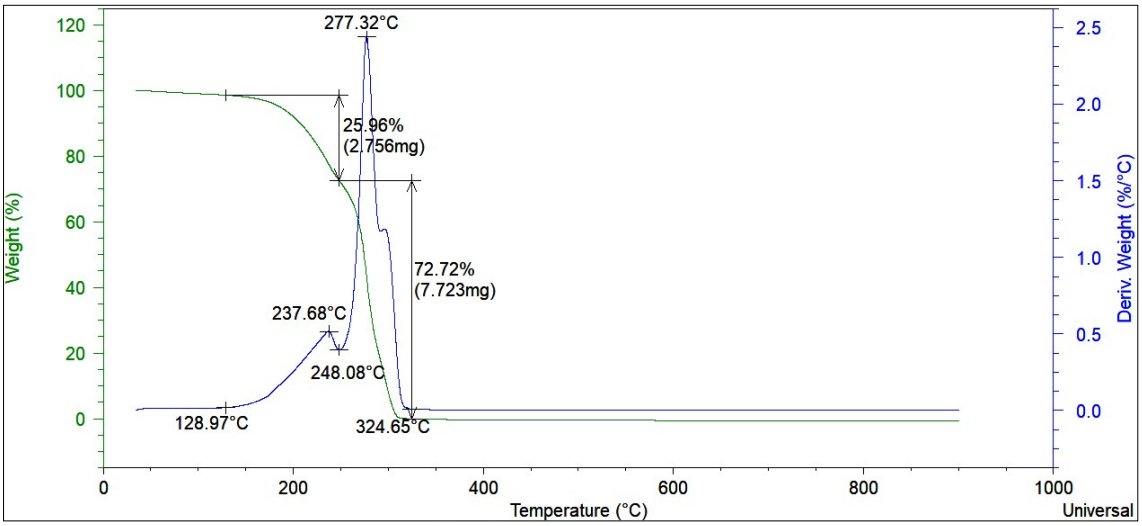


**Figure S9**. TGA of ChCl:Glycerol (1:1).

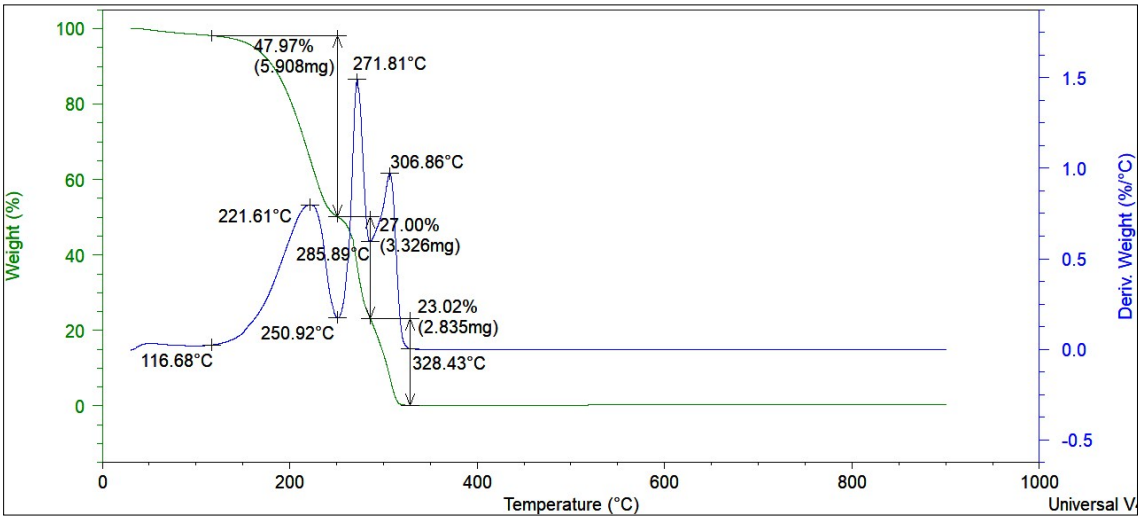


**Figure S10**. TGA of ChCl:Glycerol (1:2).

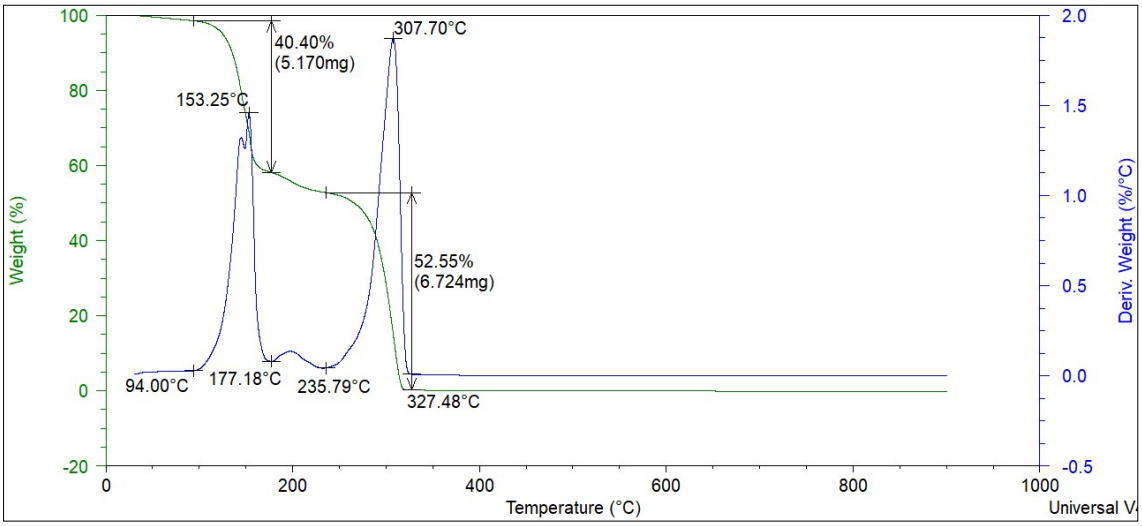


**Figure S11**. TGA of ChCl:malonic acid (1:1).

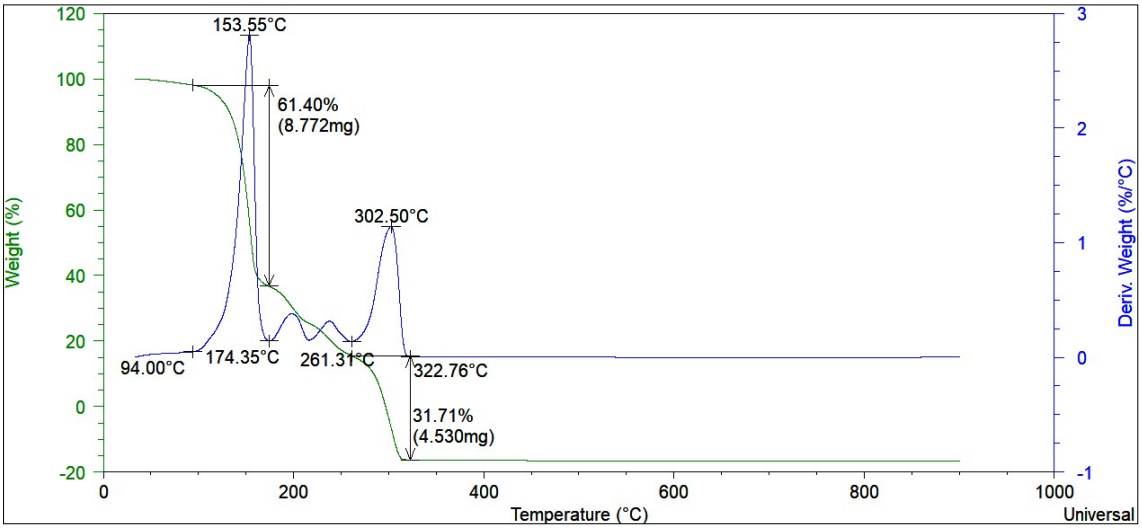


**Figure S12**. TGA of ChCl:maloni acid (1:2).

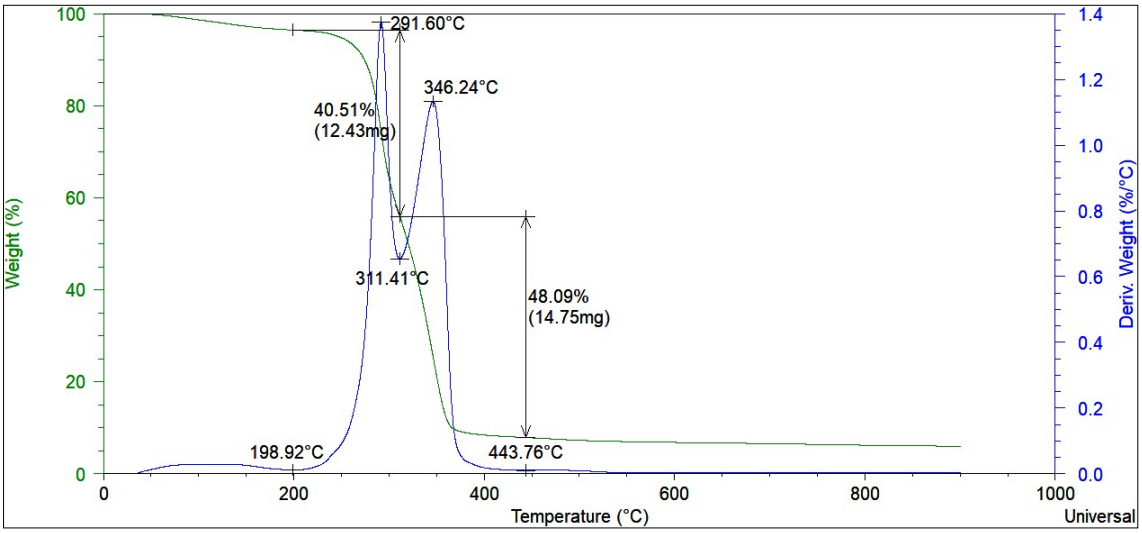


**Figure S13**. TGA of ChCl:TsOH (1:1).

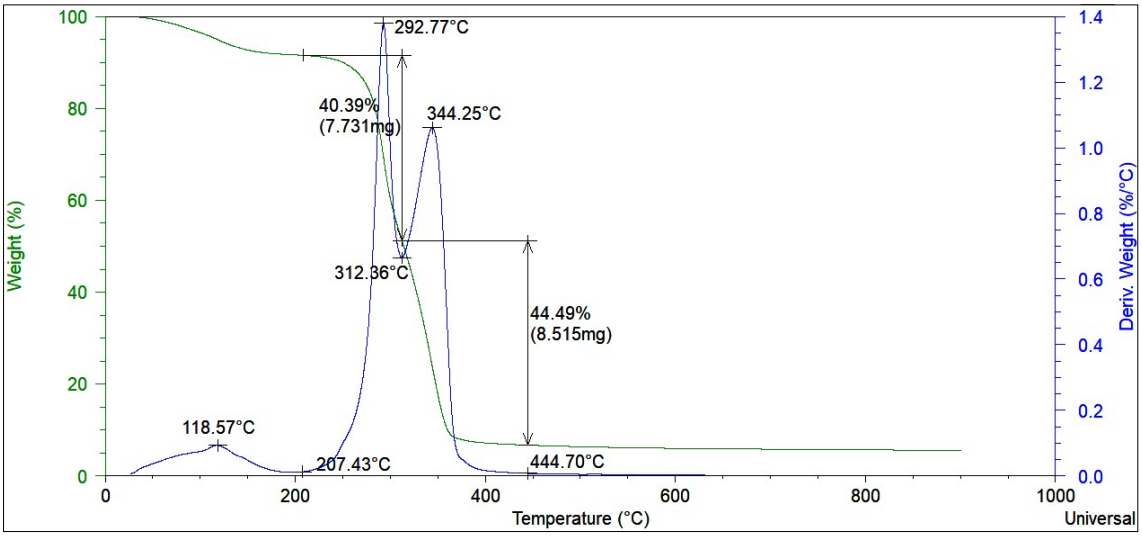


**Figure S14**. TGA of ChCl:TsOH (1:2).

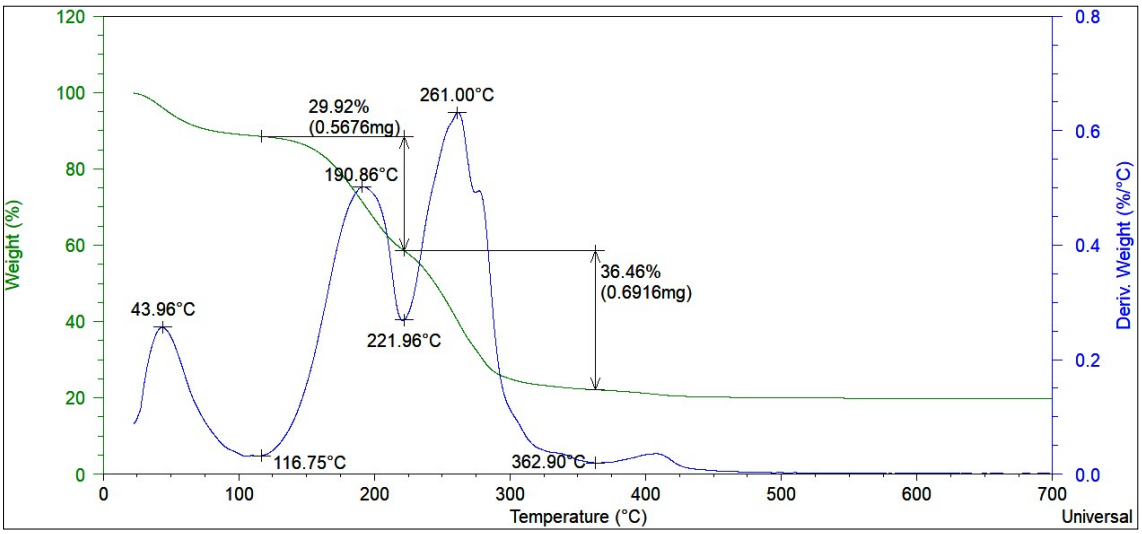


**Figure S15**. TGA of ChCl:urea 1:2+$TiO_2$ coated.

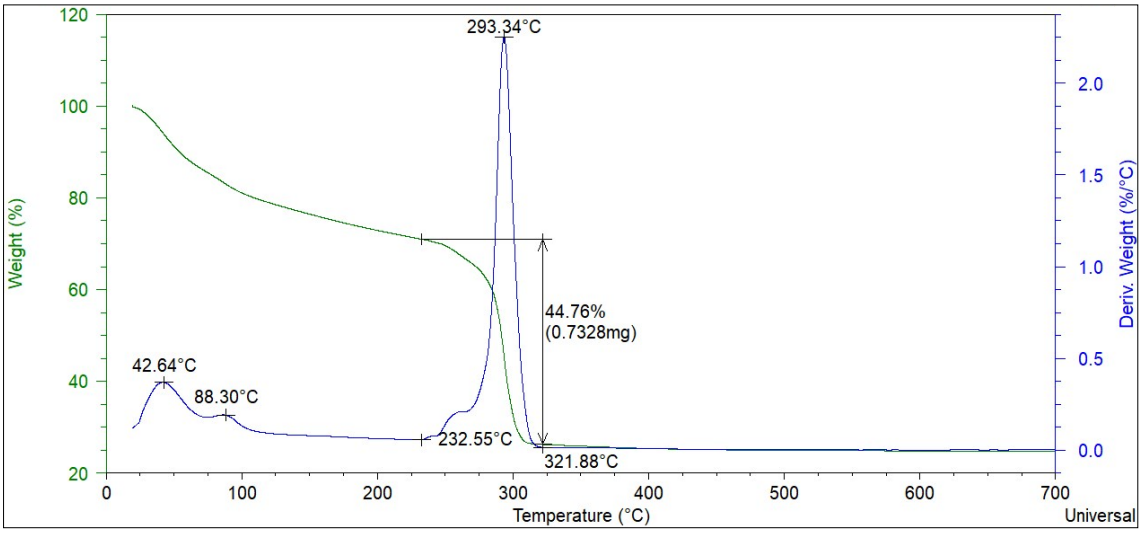


**Figure S16**. TGA of ChCl:ethyleneglycol 1:1+$TiO_2$ coated.

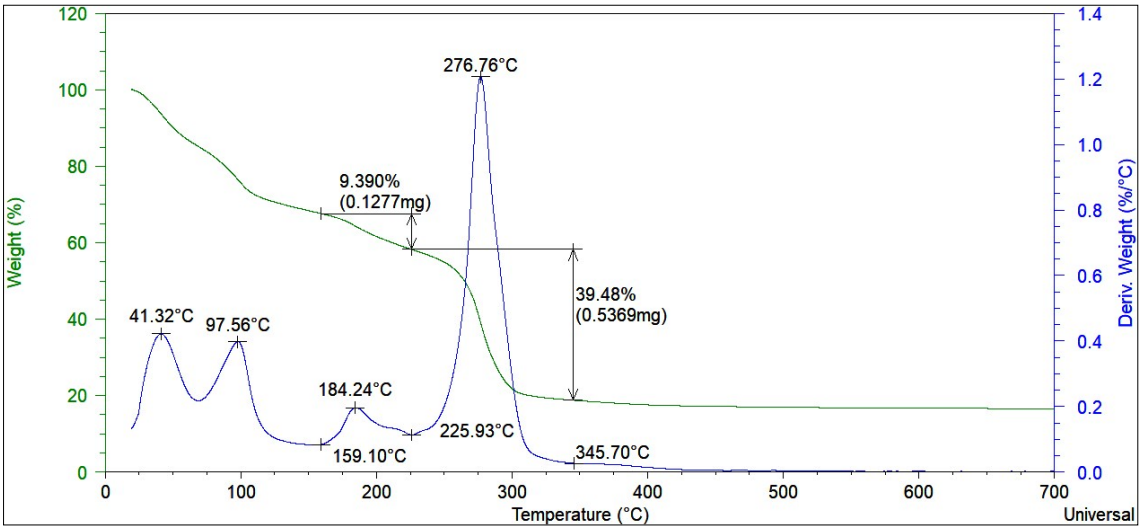


**Figure S17**. TGA of ChCl:ethyleneglycol 1:2+$TiO_2$ coated.

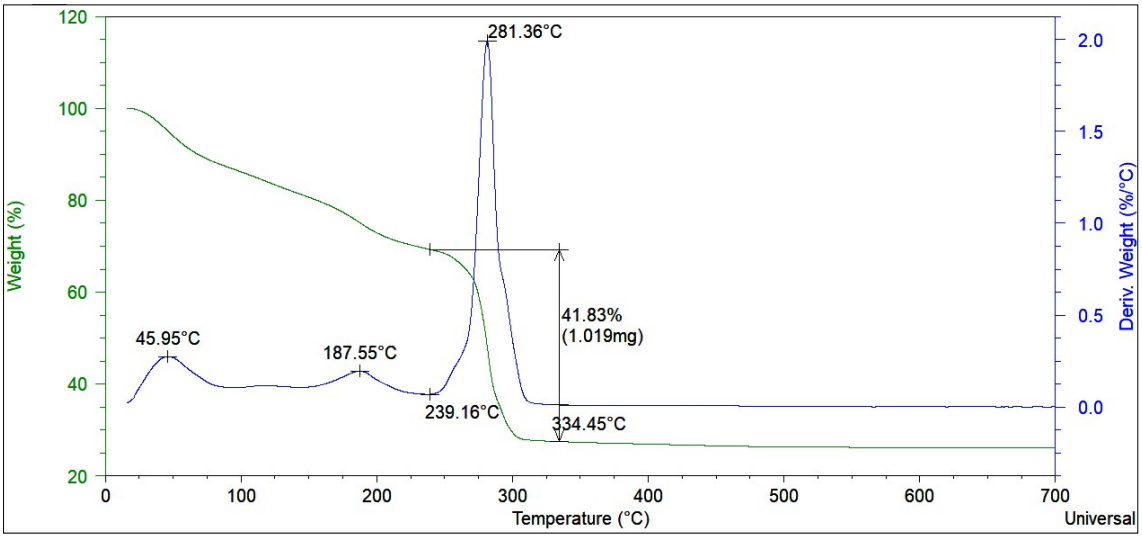


**Figure S18**. TGA of ChCl:glycerol 1:1+$TiO_2$ coated.

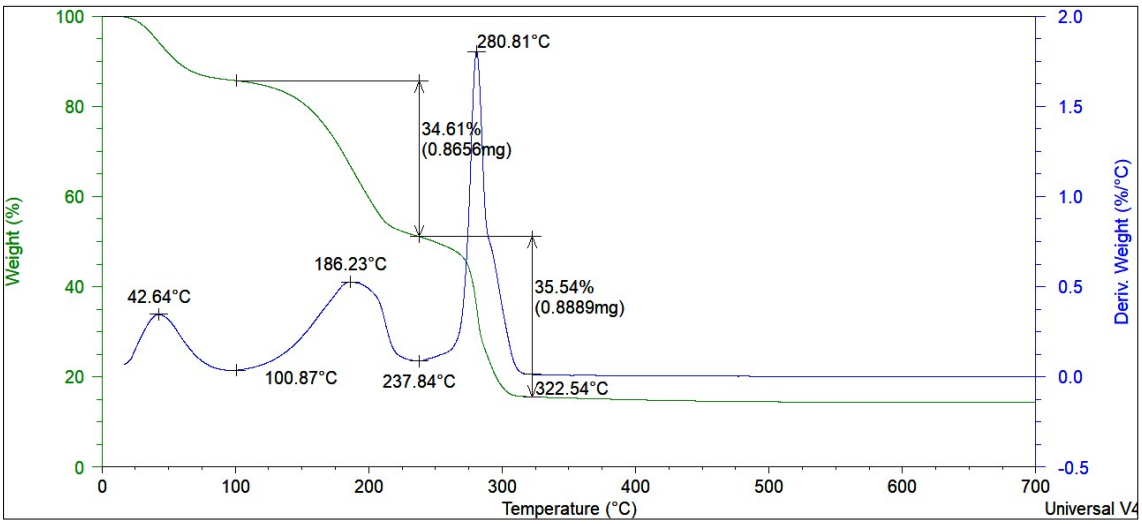


**Figure S19**. TGA of ChCl:glycerol 1:2+$TiO_2$ coated.

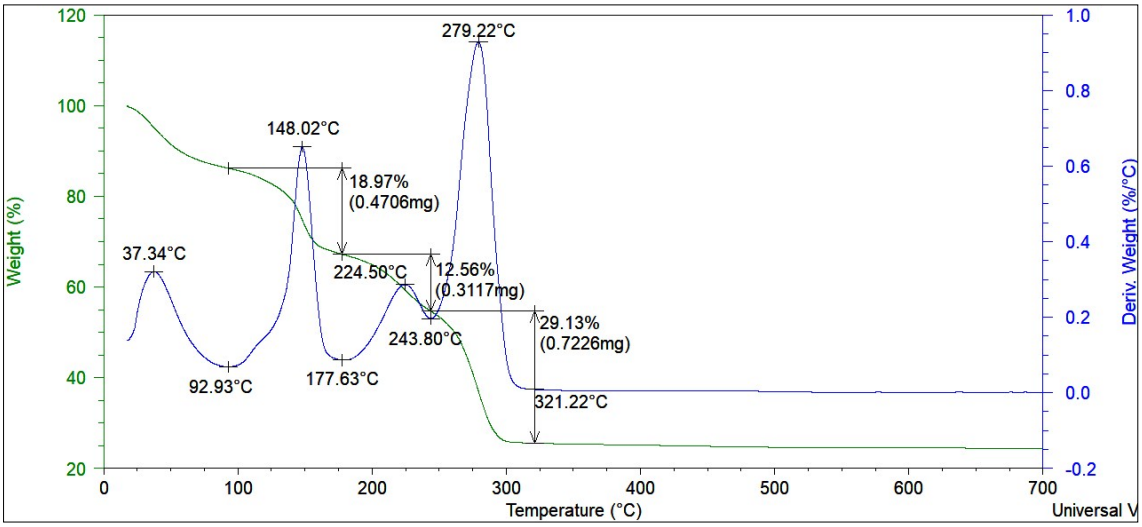


**Figure S20**. TGA of ChCl:malonic acid 1:1+$TiO_2$ coated

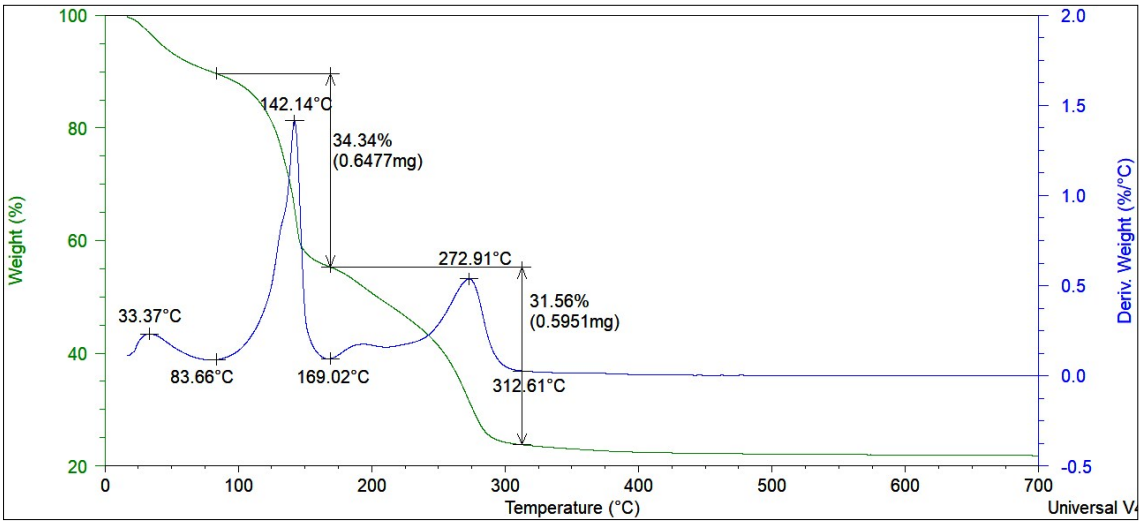


**Figure S21**. TGA of ChCl:malonic acid 1:2+$TiO_2$ coated.

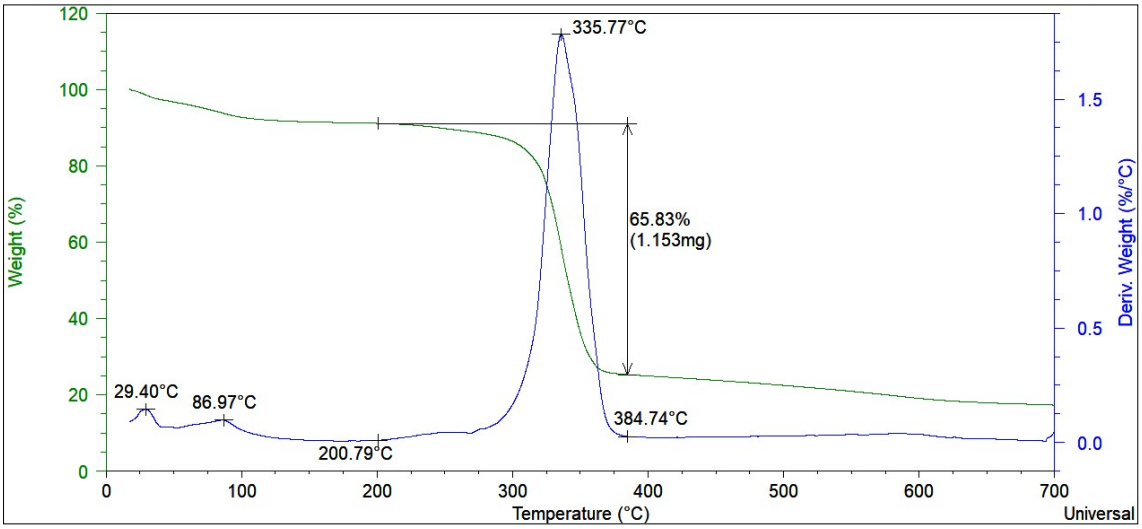


**Figure S22**. TGA of ChCl:TsOH 1:1+$TiO_2$ coated.

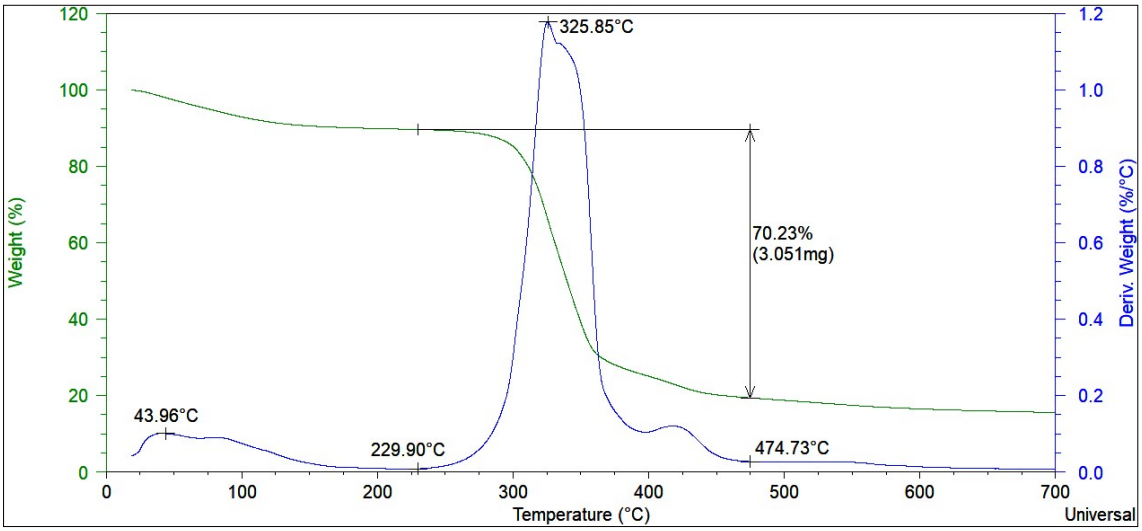


**Figure S23**. TGA of ChCl:TsOH 1:2+$TiO_2$ coated.

## DSC CURVES

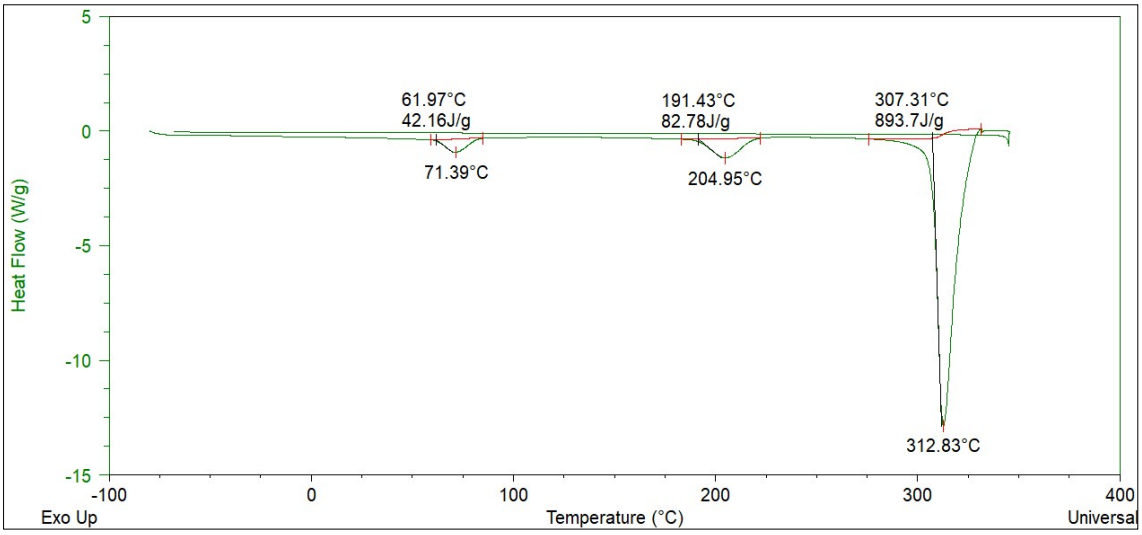


**Figure S23**. DSC curve of choline chloride. Cycle 1.

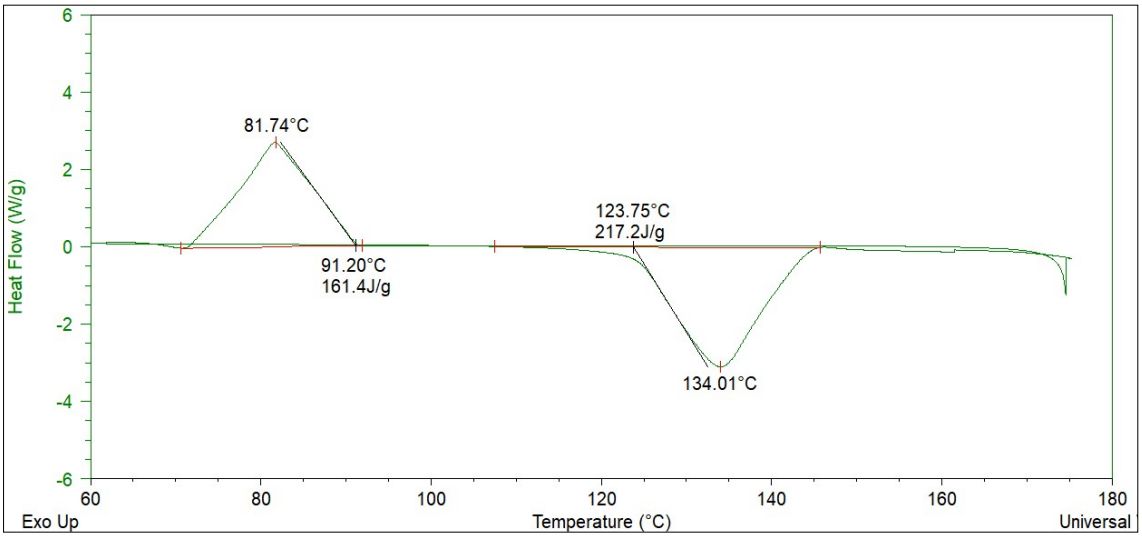


**Figure S24**. DSC curve of Urea. Cycle 1.

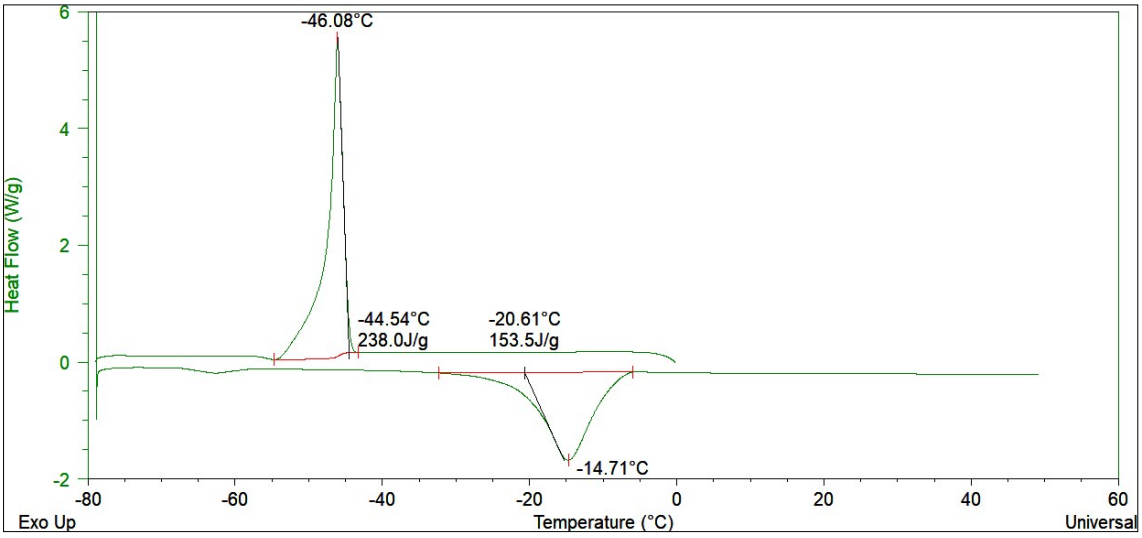


**Figure S25**. DSC curve of Ethyleneglycol. Cycle 1.

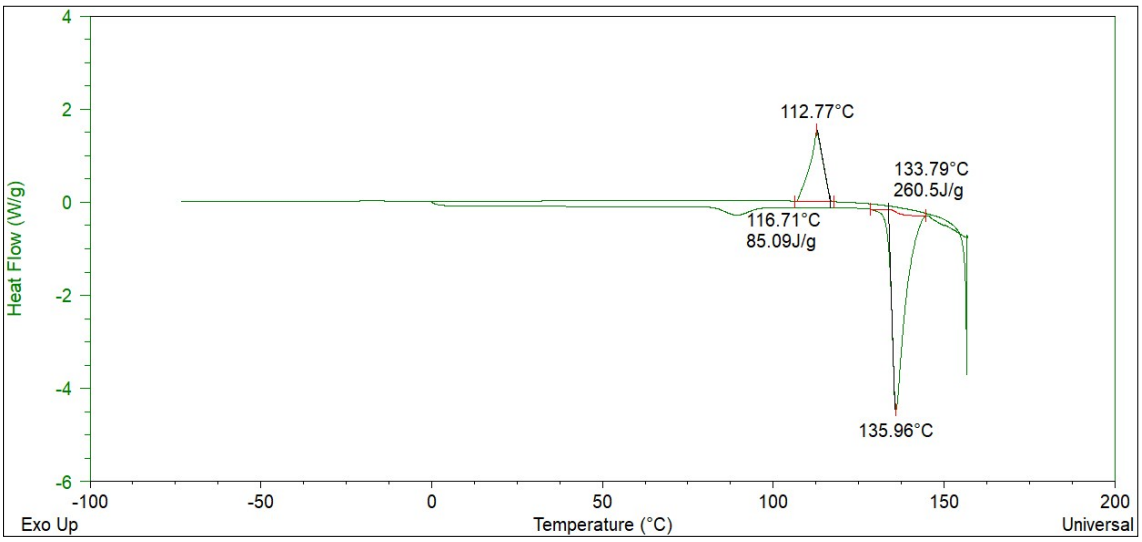


**Figure S26**. DSC curve of Malonic Acid. Cycle 1.

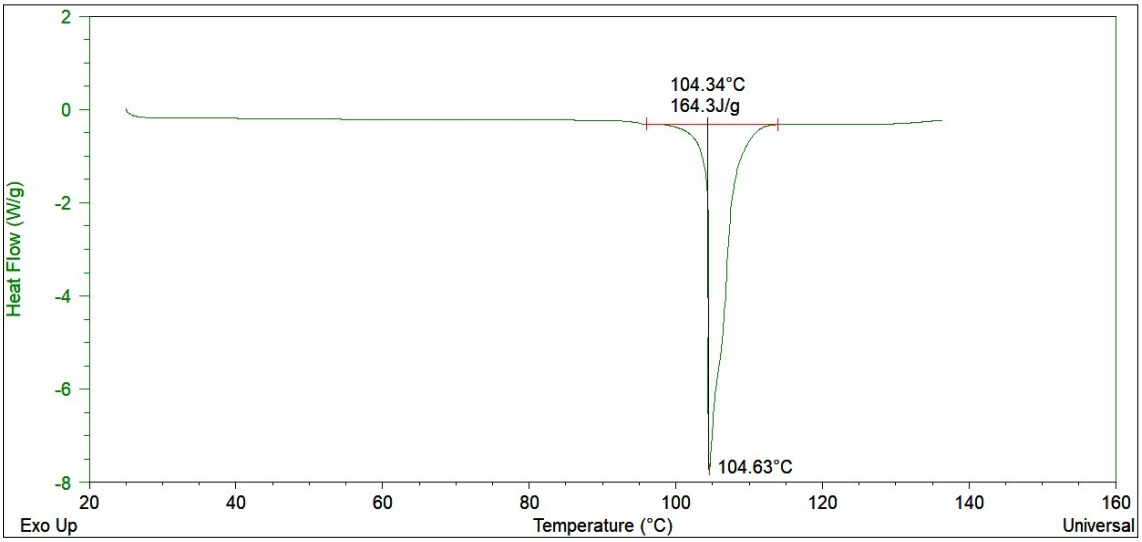


**Figure S27**. DSC curve of TsOH. Cycle 1

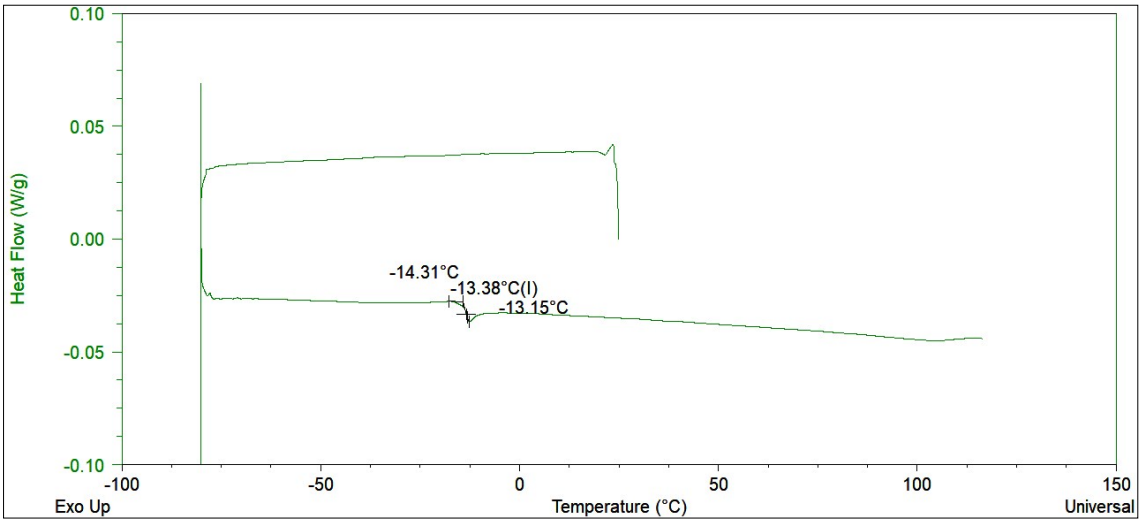


**Figure S28**. DSC curve of Glicerol. Cycle 1.

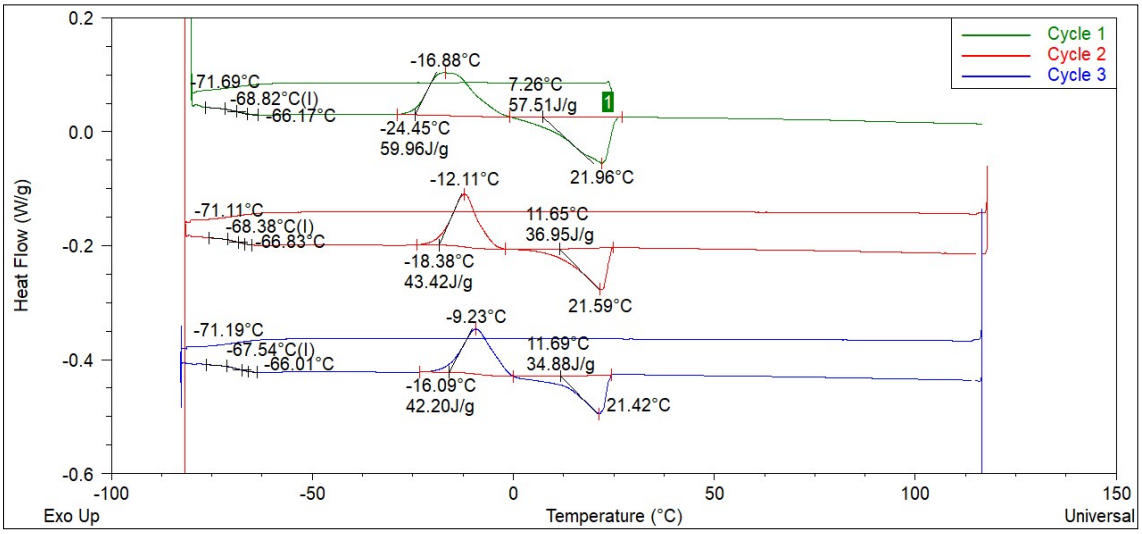


**Figure S28**. DSC curve of ChCl:Urea (1:2).

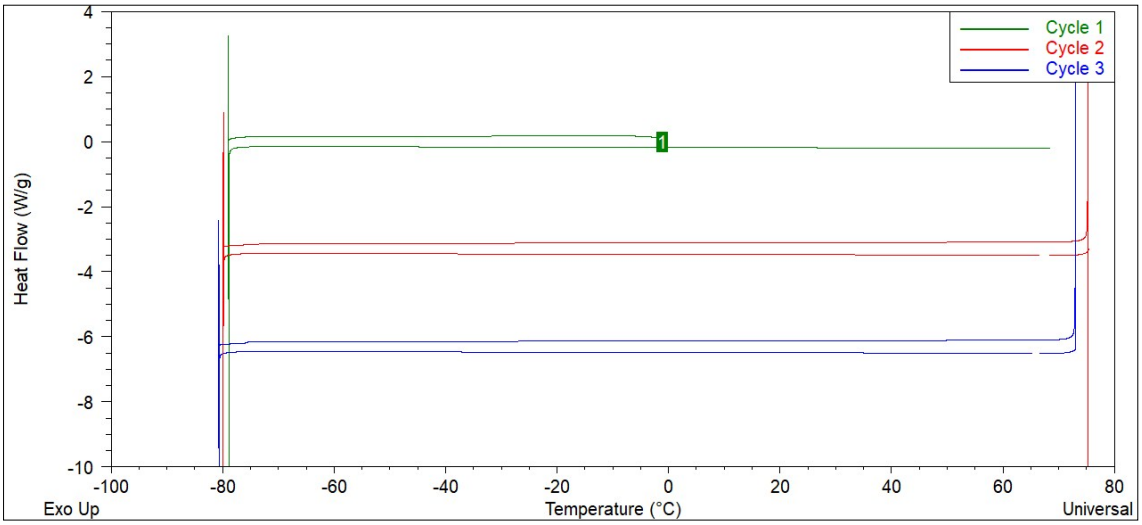


**Figure S29**. DSC curve of ChCl:Ethyleneglycol (1:1).

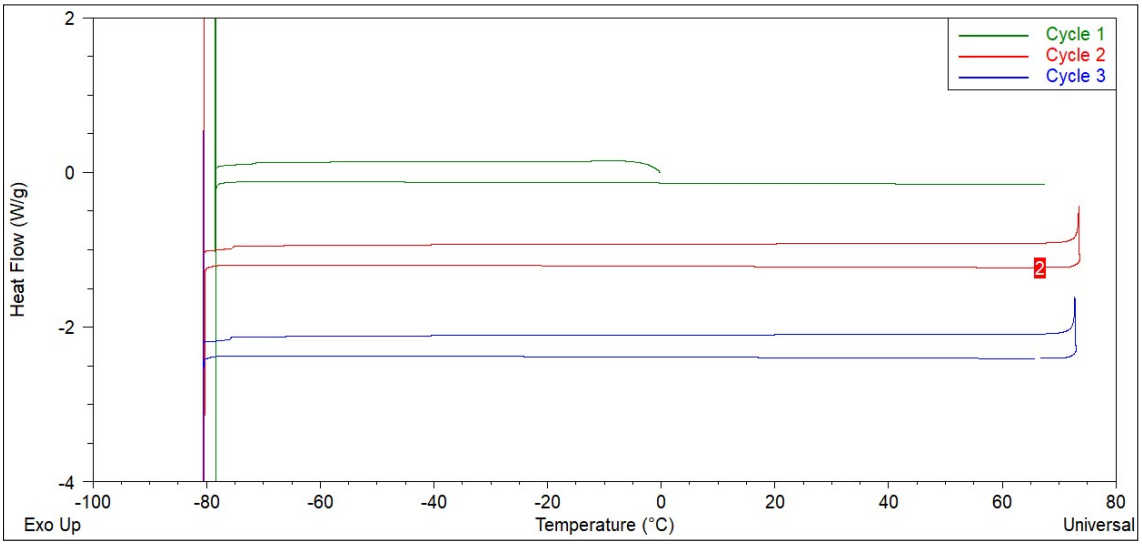


**Figure S30**. DSC curve of ChCl:Ethyleneglycol (1:2).

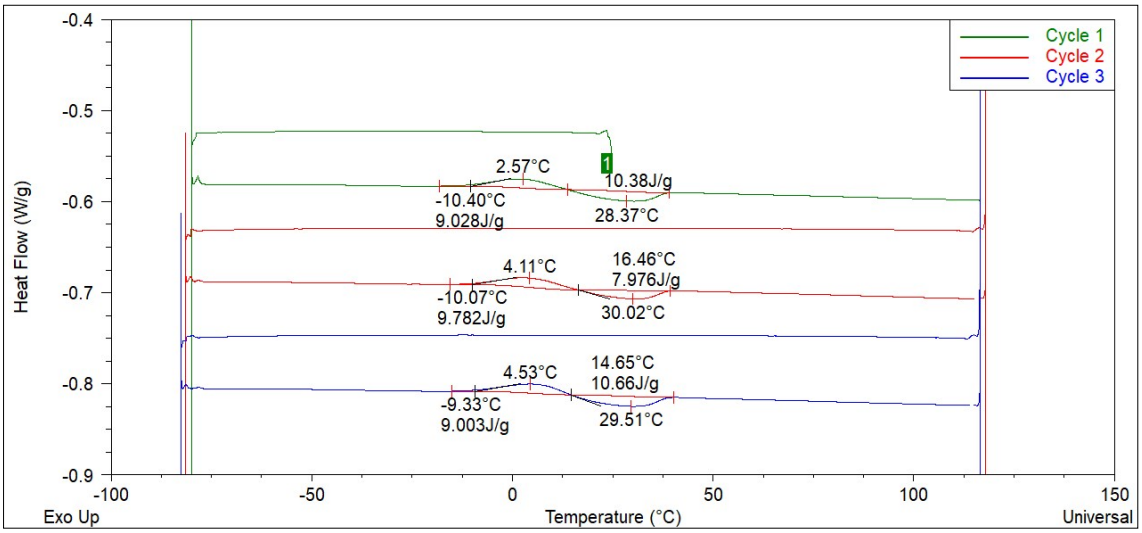


**Figure S31**. DSC curve of ChCl:Glycerol (1:1).

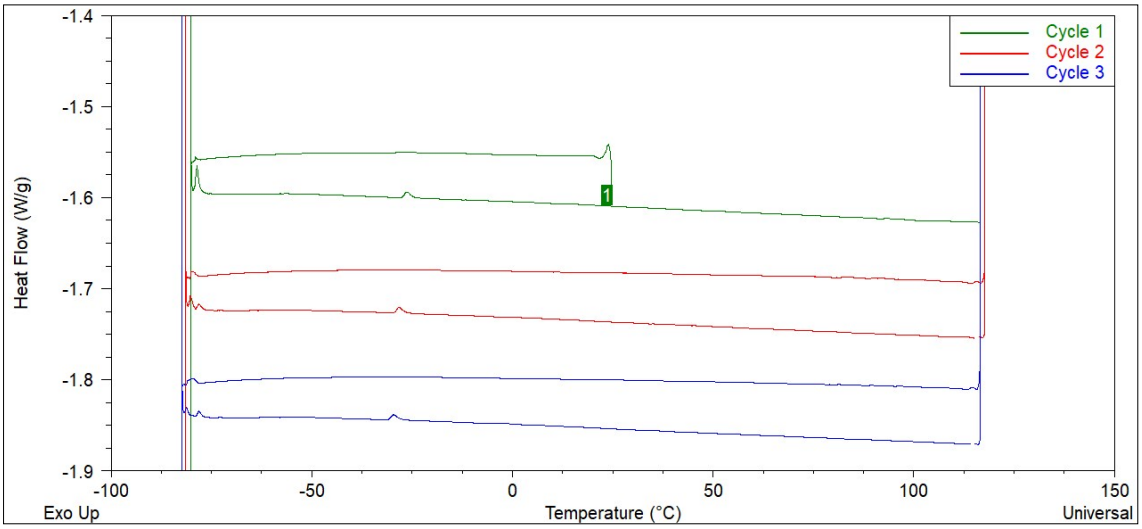


**Figure S32**. DSC curve of ChCl:Glycerol (1:2).

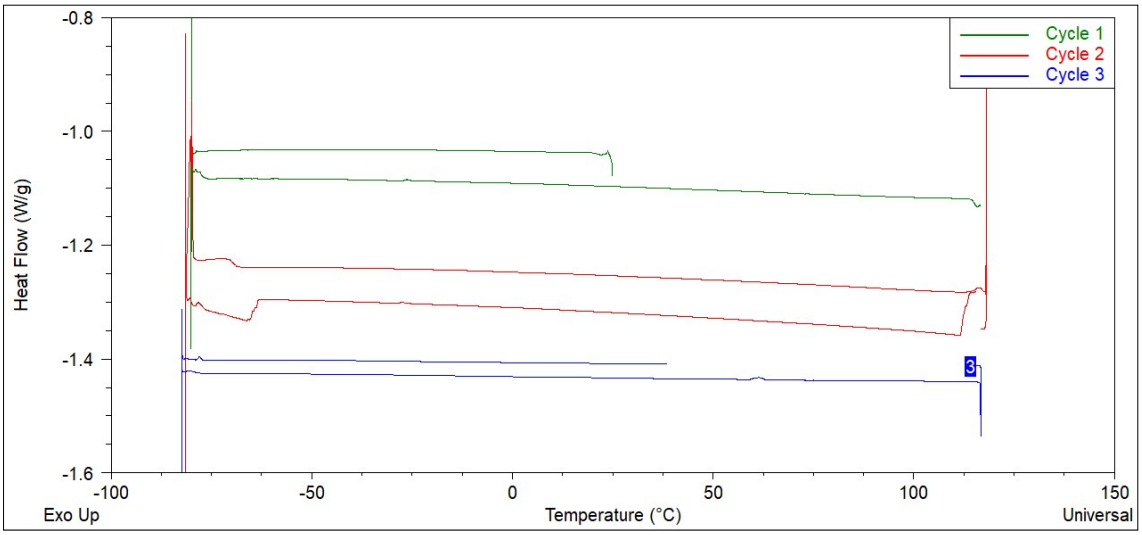


**Figure S33**. DSC curve of ChCl:Malonic Acid (1:1).

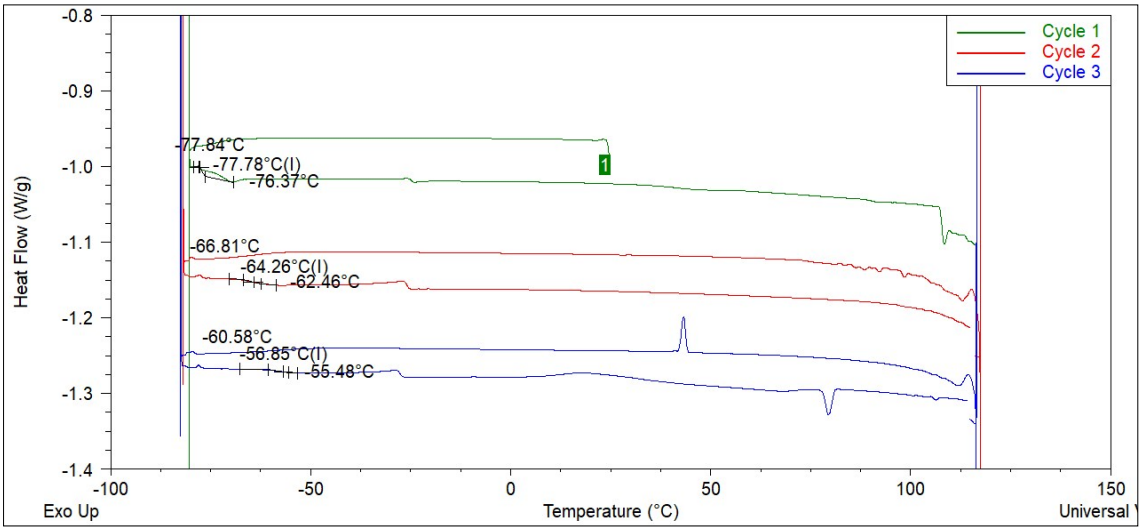


**Figure S34**. DSC curve of ChCl:Malonic Acid (1:2).

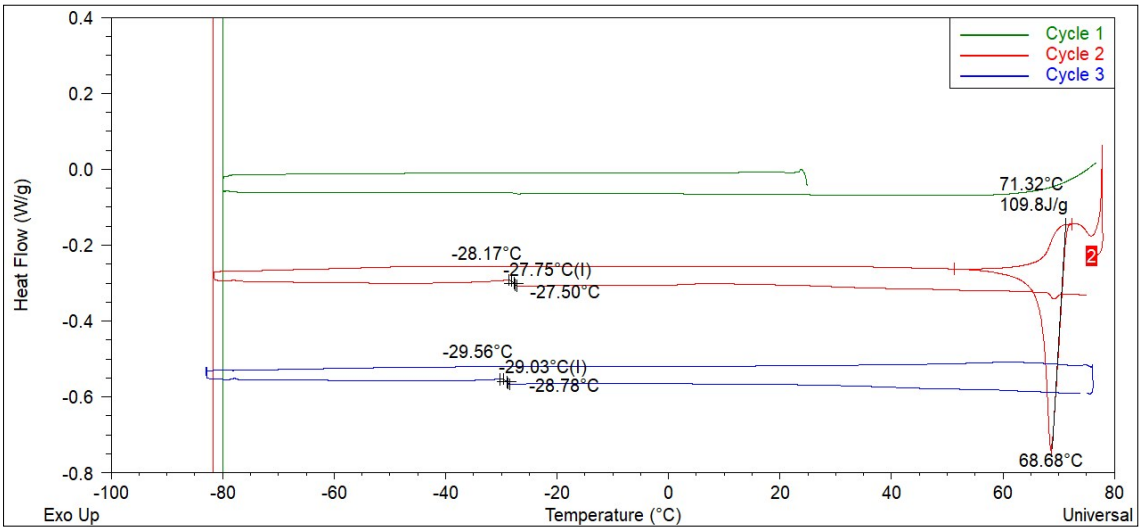


**Figure S35**. DSC curve of ChCl:TsOH (1:1).

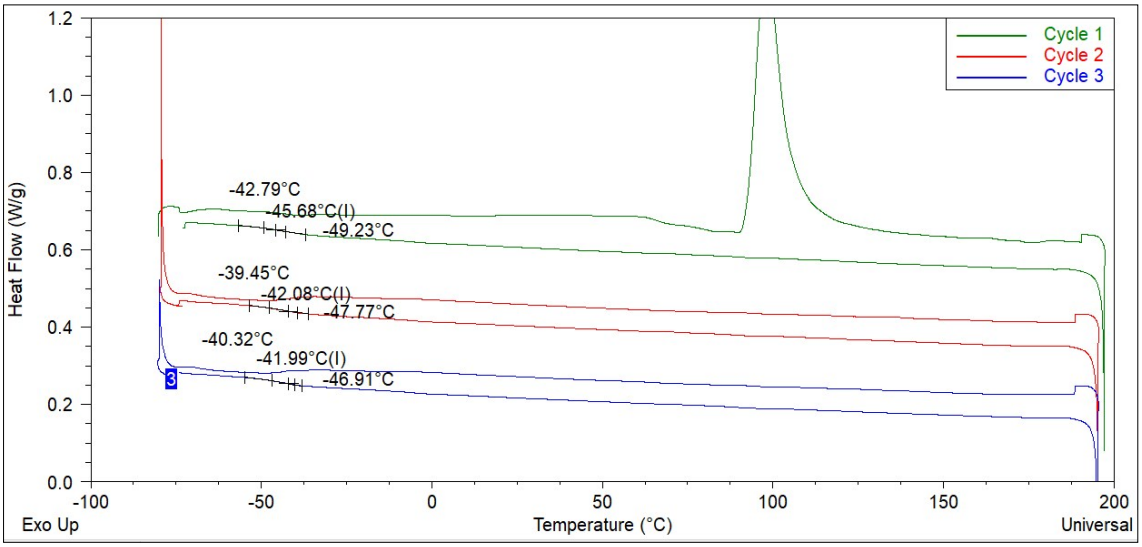


**Figure S36**. DSC curve of ChCl:TsOH (1:2).

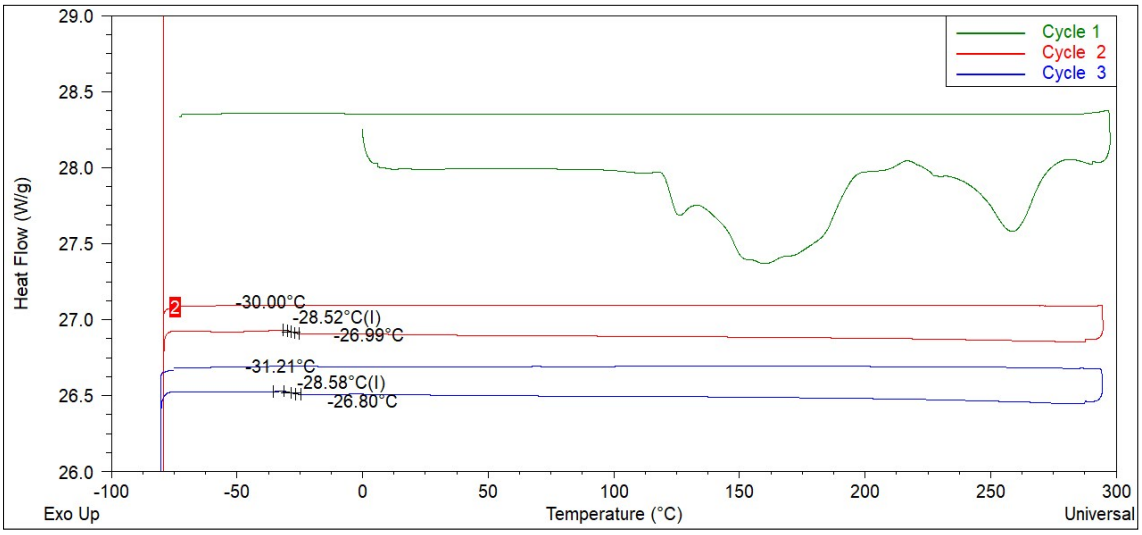


**Figure S37**. DSC curve of ChCl:urea (1:2)+$TiO_2$ coated.

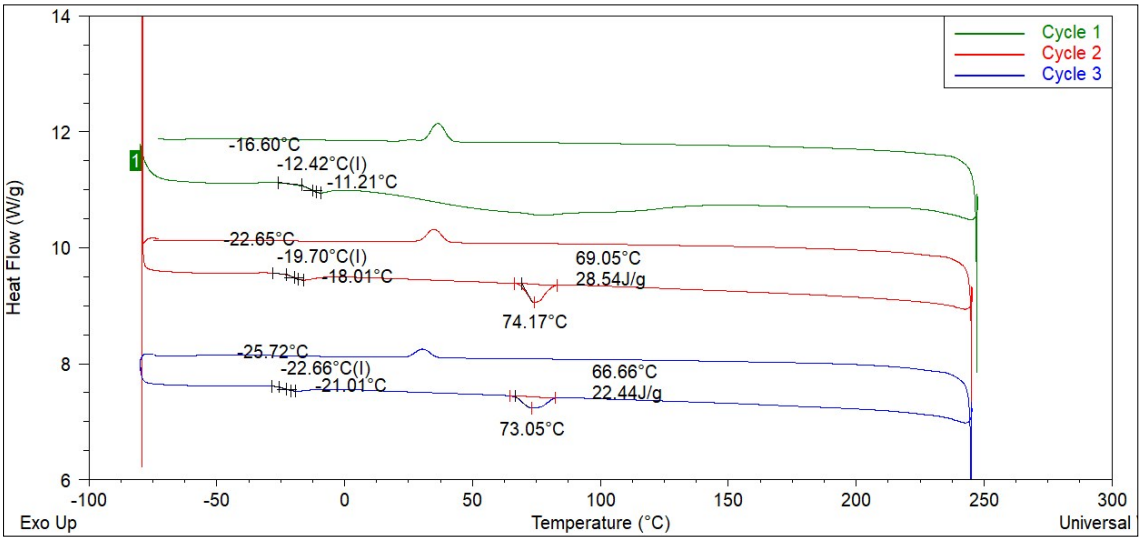


**Figure S38**. DSC curve of ChCl:ethyleneglycol (1:1)+$TiO_2$ coated.

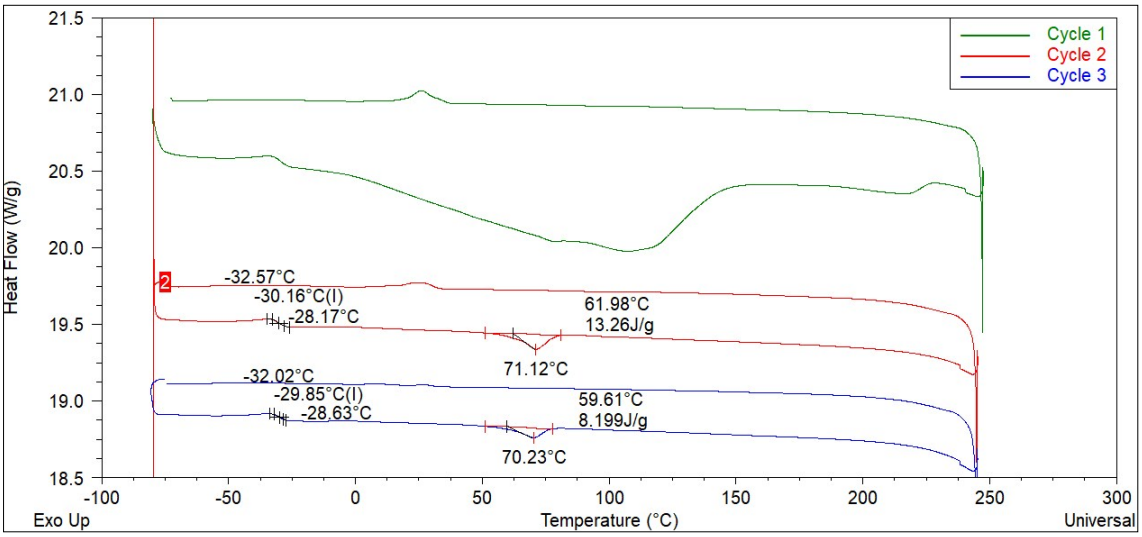


**Figure S39**. DSC curve of ChCl:ethyleneglycol (1:2)+$TiO_2$ coated.

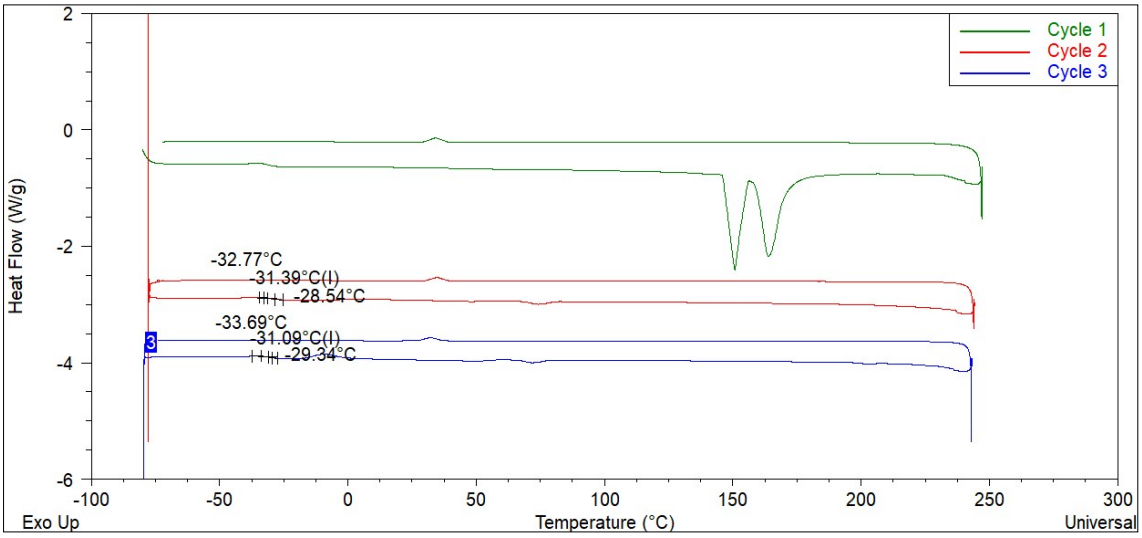


**Figure S40**. DSC curve of ChCl:glycerol (1:1)+$TiO_2$ coated.

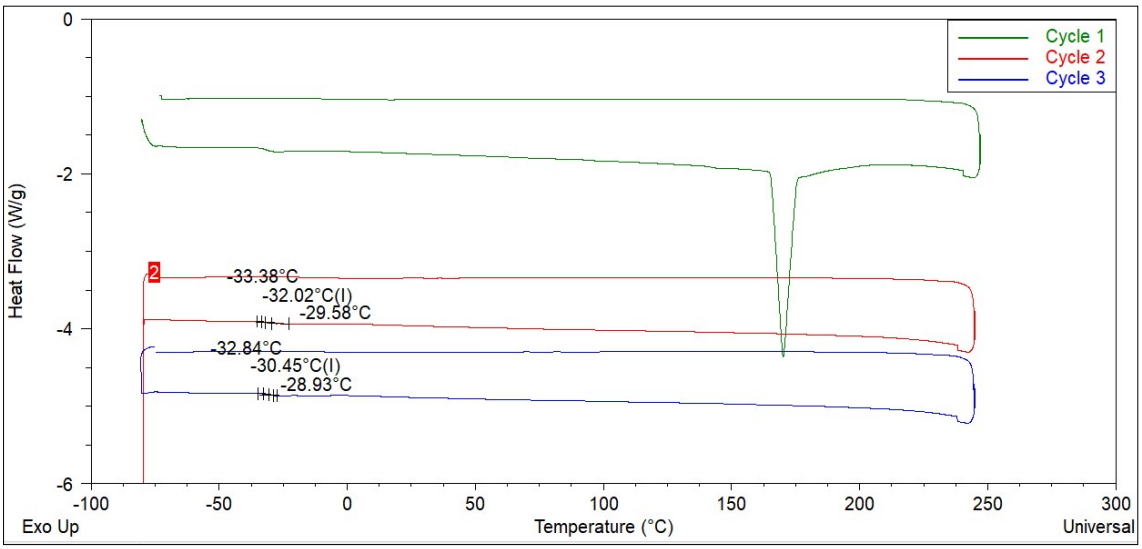


**Figure S41**. DSC curve of ChCl:glycerol (1:2)+$TiO_2$ coated.

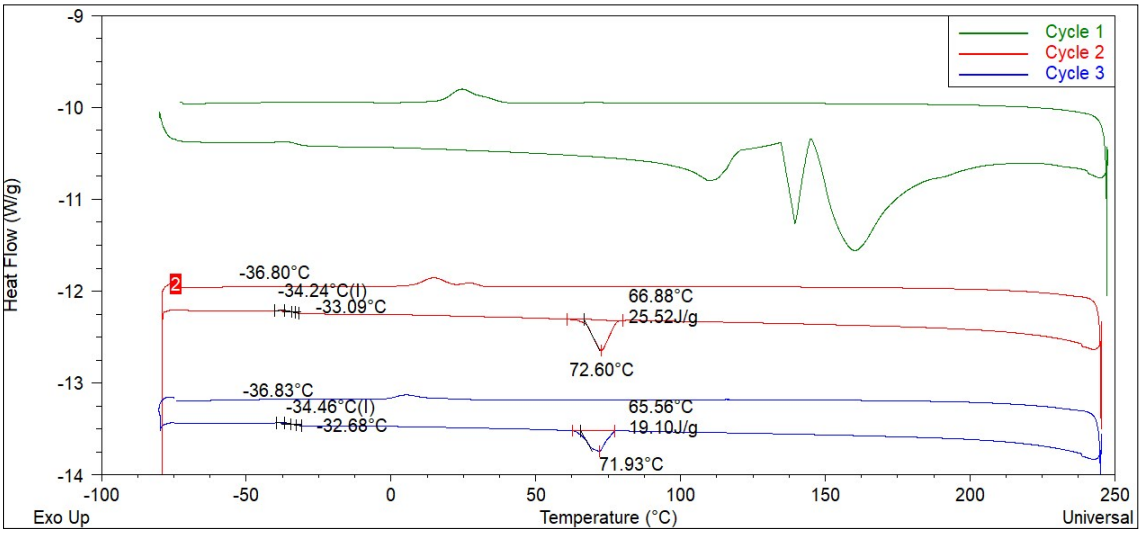


**Figure S42**. DSC curve of ChCl:malonic acid (1:1)+$TiO_2$ coated.

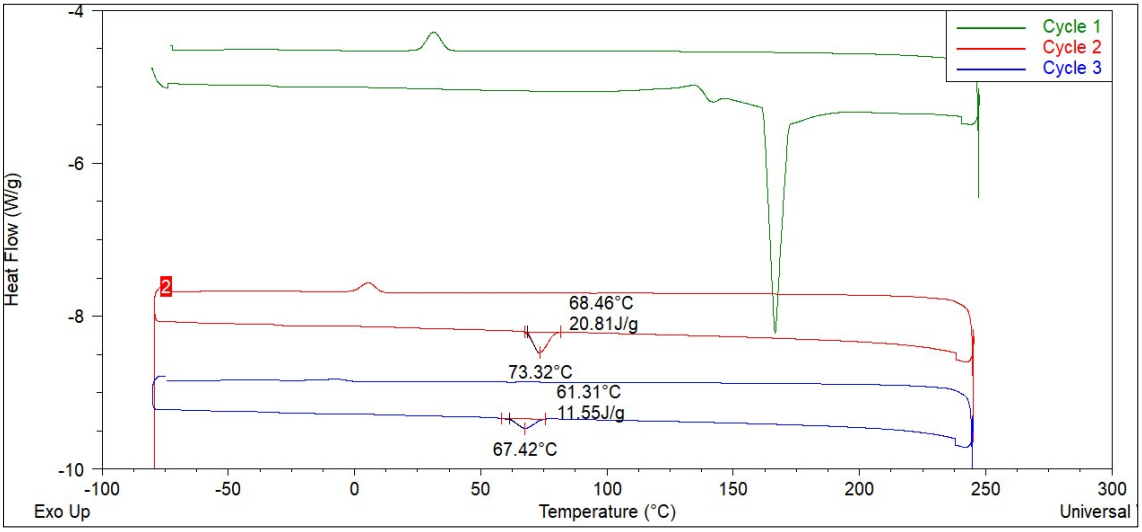


**Figure S43**. DSC curve of ChCl:malonic acid (1:2)+$TiO_2$ coated.

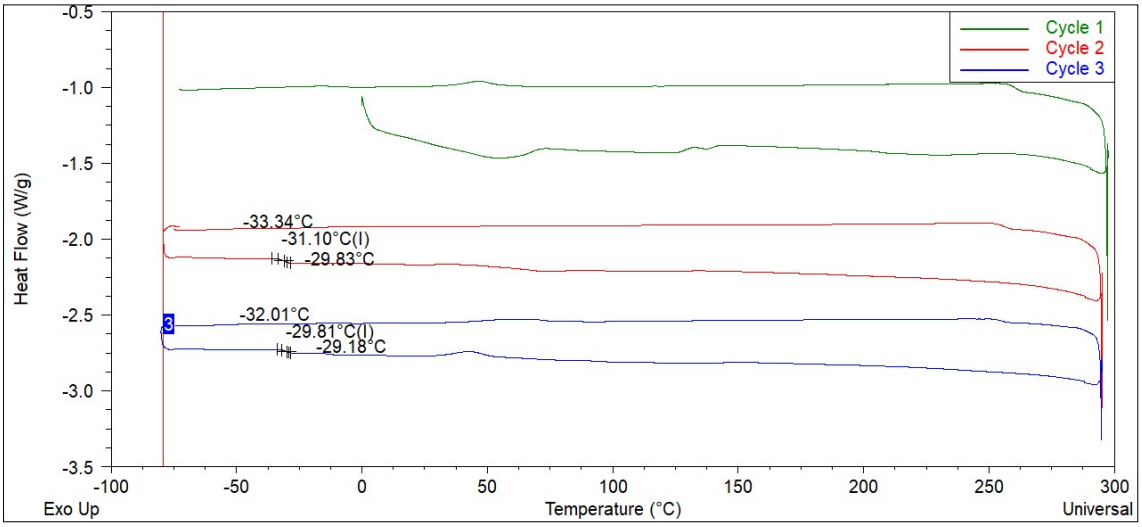


**Figure S44**. DSC curve of ChCl:TsOH (1:1)+$TiO_2$ coated.

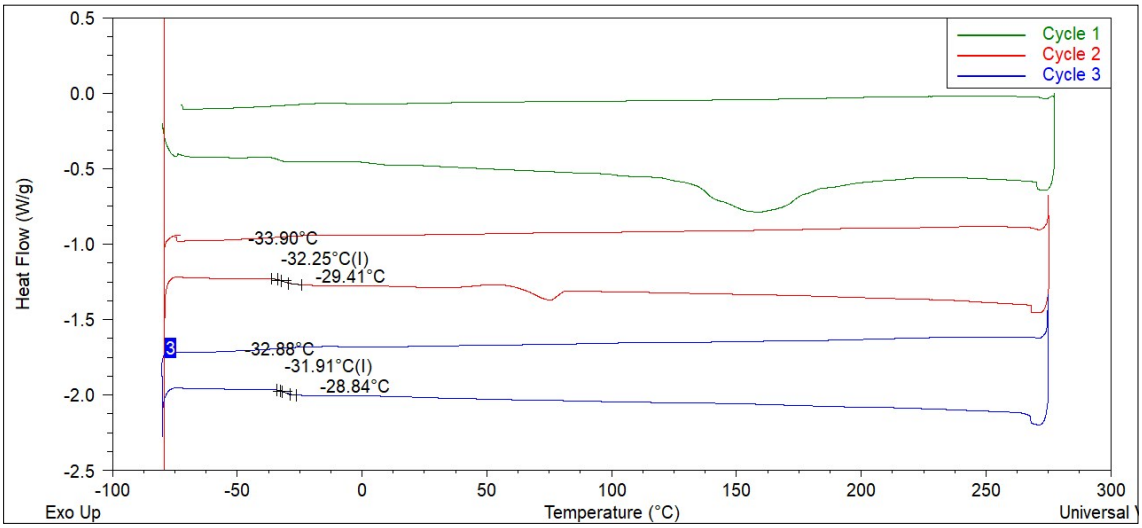


**Figure S45**. DSC curve of ChCl:TsOH (1:2)+$TiO_2$ coated.

## POWDER XRD IMAGES

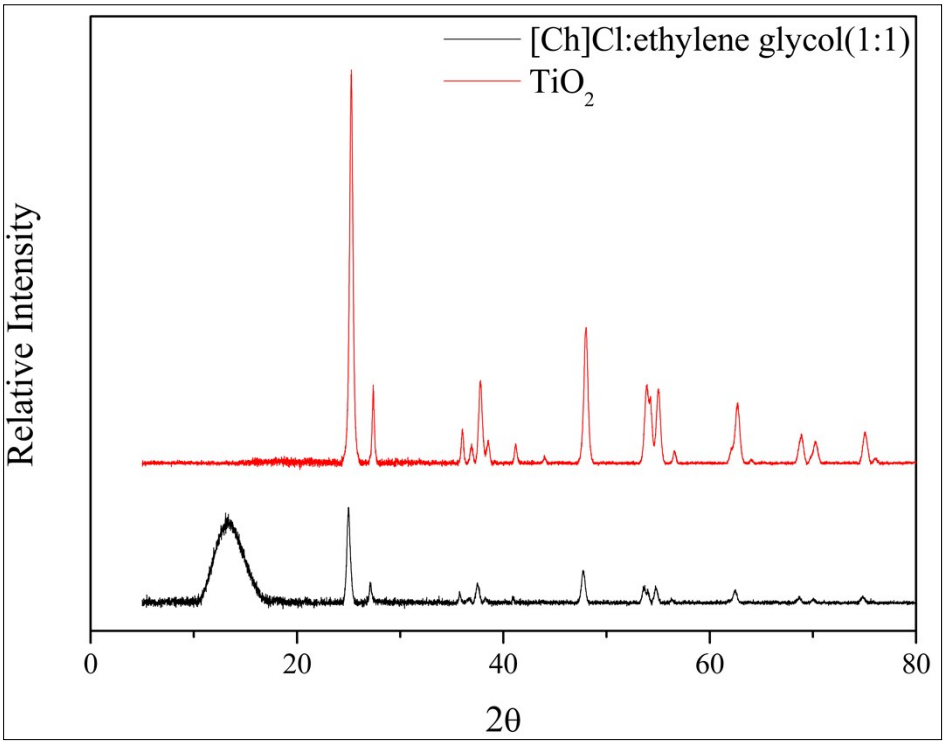


**Figure S46.** XRD data of pure $TiO_2$ (**red**) and [Ch]Cl:ethylene glycol (1:1)+$TiO_2$(**black**).

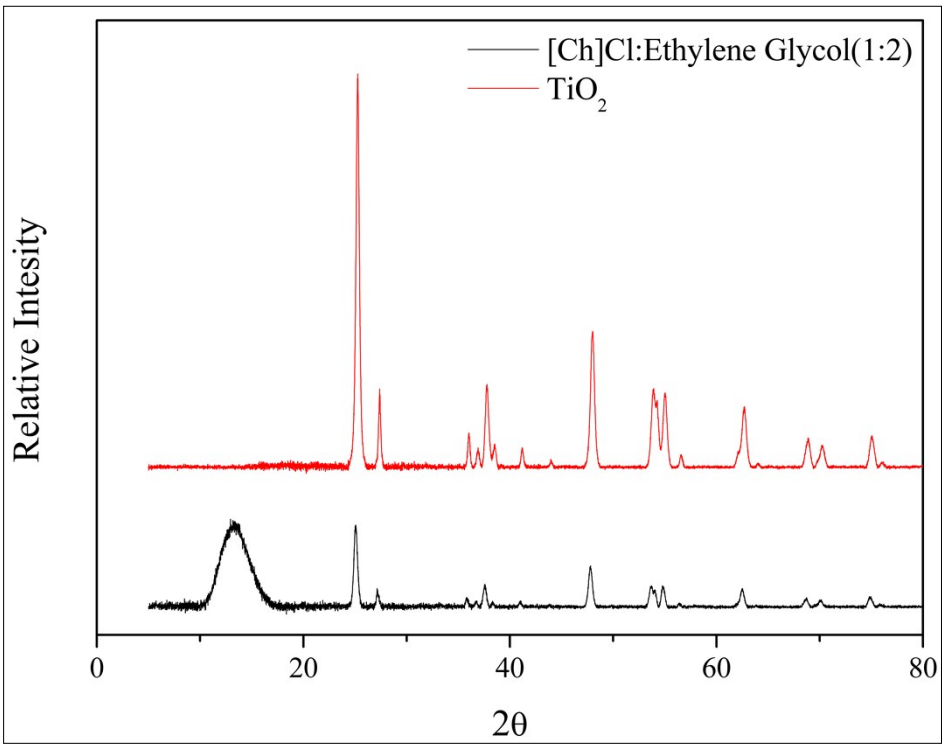


**Figure S47.** XRD data of pure $TiO_2$ (**red**) and [Ch]Cl:ethylene glycol (1:2)+$TiO_2$ (**black**).

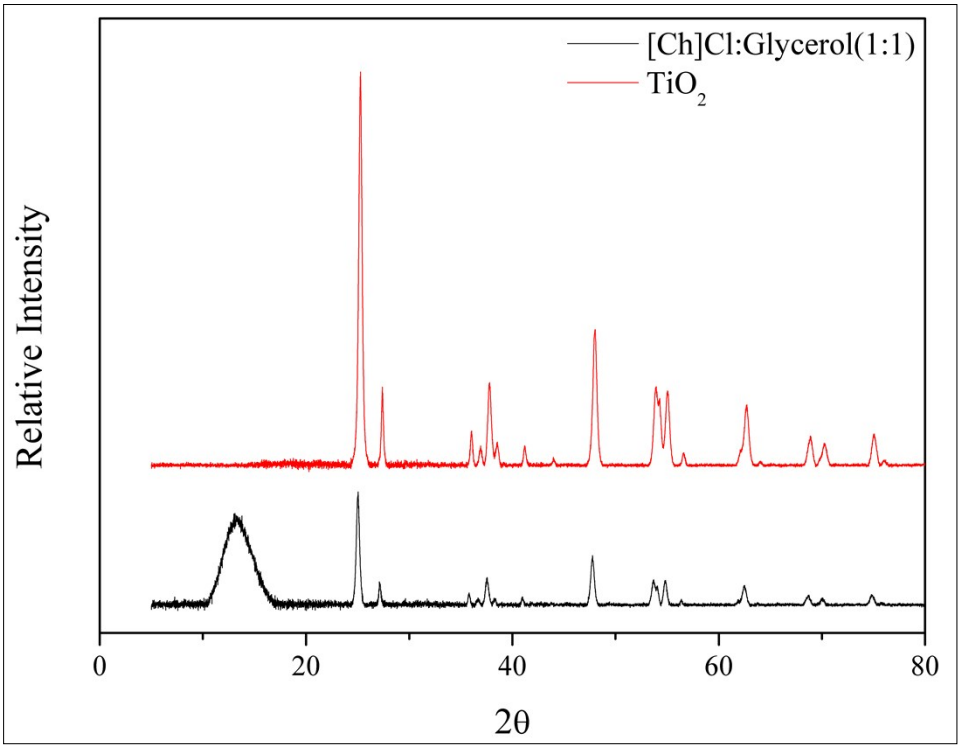


**Figure S48.** XRD data of pure $TiO_2$ (**red**) and [Ch]Cl:glycerol (1:1)+$TiO_2$ (**black**).

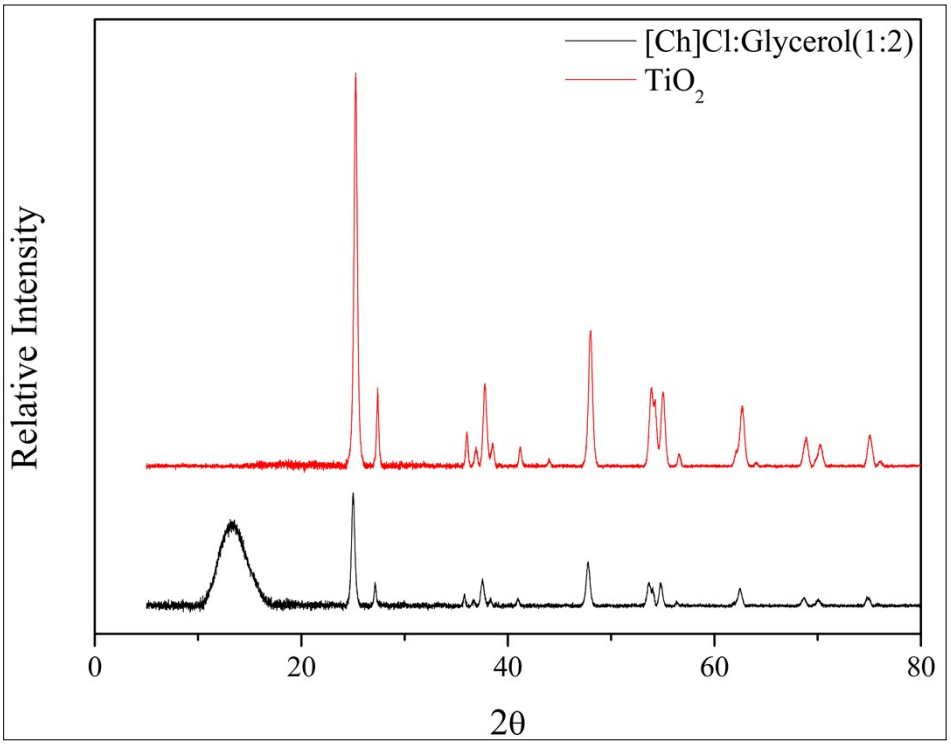


**Figure S49.** XRD data of pure $TiO_2$ (**red**) and [Ch]Cl:glycerol (1:2)+$TiO_2$ (**black**).

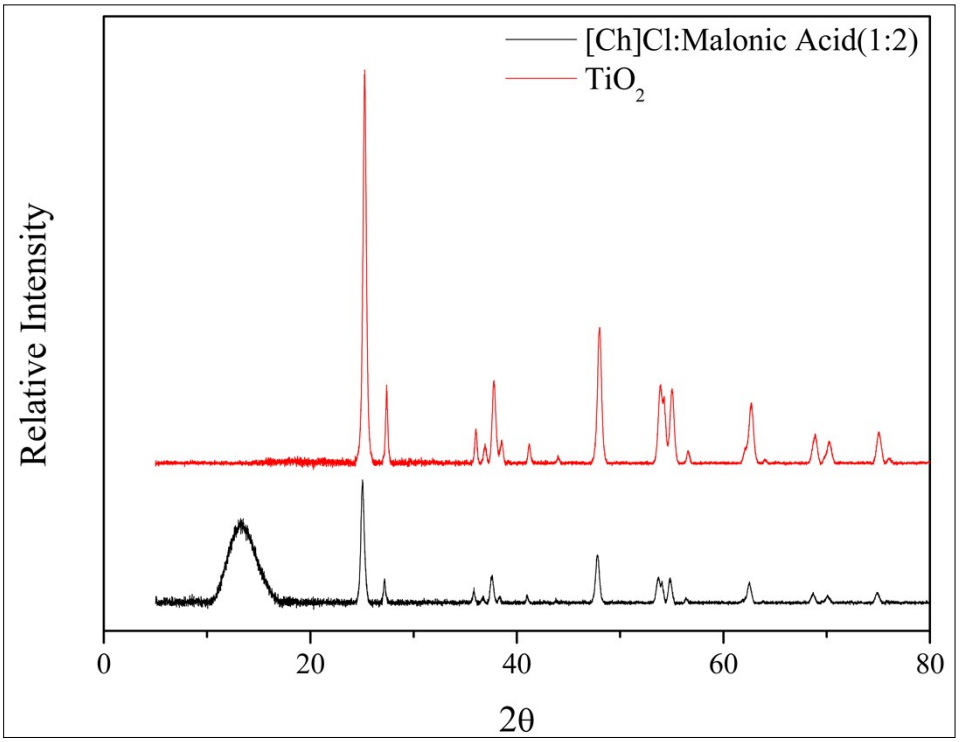


**Figure S50.** XRD data of pure $TiO_2$ (**red**) and [Ch]Cl:Malonic Acid (1:2)+$TiO_2$ (**black**).

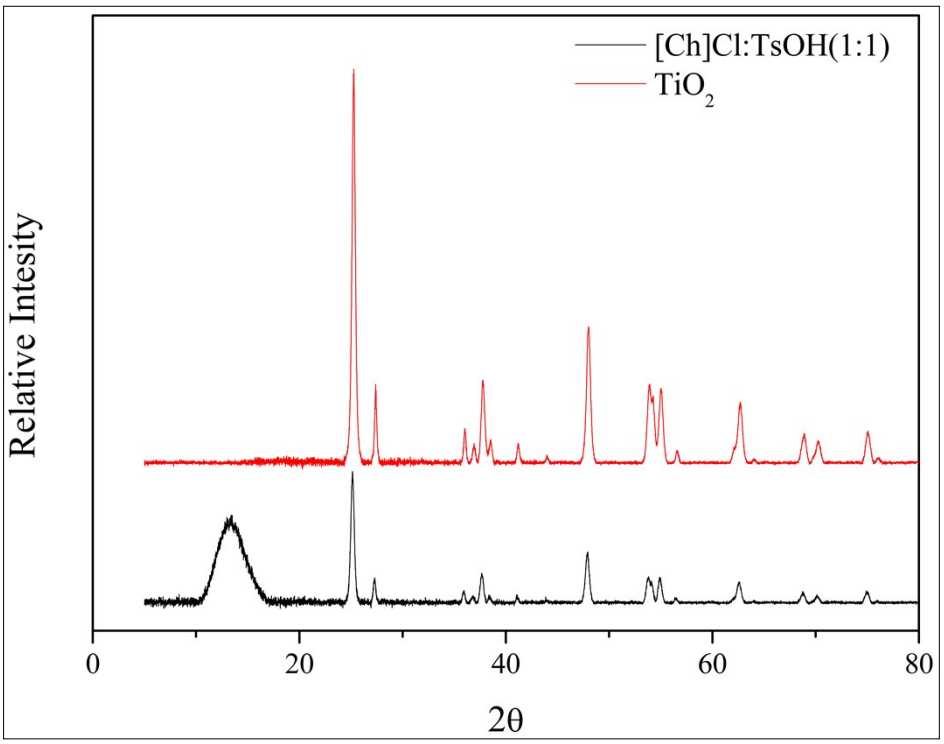


**Figure S51.** XRD data of pure $TiO_2$ (**red**) and [Ch]Cl:Toluene Sulfonic Acid (1:1)+$TiO_2$ (**black**).

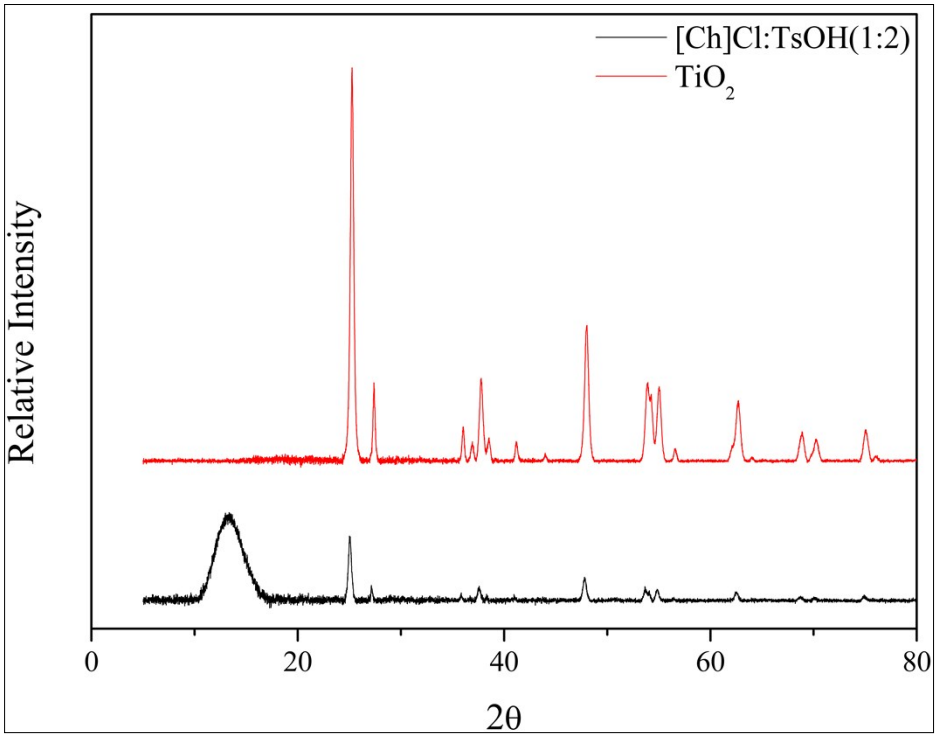


**Figure S52.** XRD data of pure $TiO_2$ (**red**) and [Ch]Cl:Toluene Sulfonic Acid (1:2)+$TiO_2$ (**black**).

## PHOTOCATALISYS GRAPHS

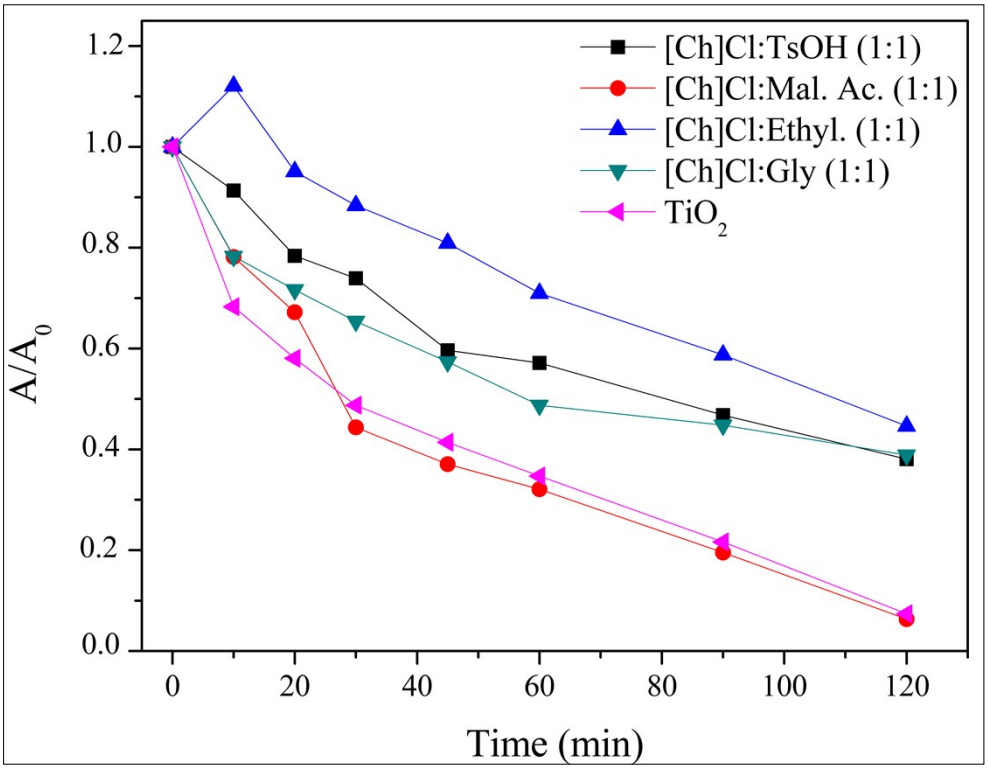


**Figure S53.** Graph of MO photodecomposition promoted by DES+TiO2 coated**.** ChCl:TsOH 1:1+TiO2 coated (**black**); ChCl:malonic acid 1:1+TiO2 coated (**red**); ChCl:ethyleneglycol 1:1+TiO2 coated (**blue**); ChCl:glycerol 1:1+TiO2 coated (**green**); TiO2 pure (**pink**).

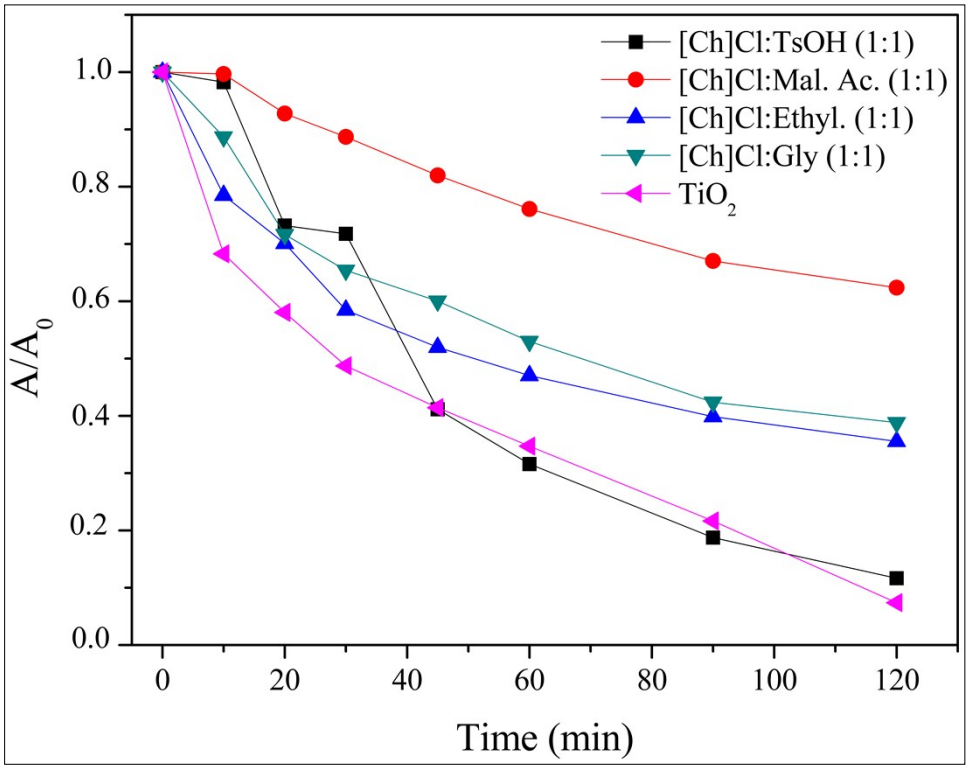


**Figure S54.** Graph of MO photodecomposition promoted by DES+$TiO_2$**.** ChCl:TsOH 1:1+TiO2 coated (**black**); ChCl:malonic acid 1:1+TiO2 coated (**red**); ChCl:ethyleneglycol 1:1+TiO2 coated (**blue**); ChCl:glycerol 1:1+TiO2 coated (**green**); TiO2 pure (**pink**).