

# Poly(glycerol citrate)+PLLA nonwovens for possible biomedical applications



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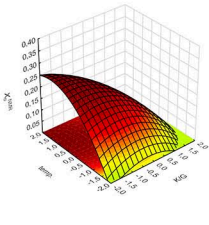
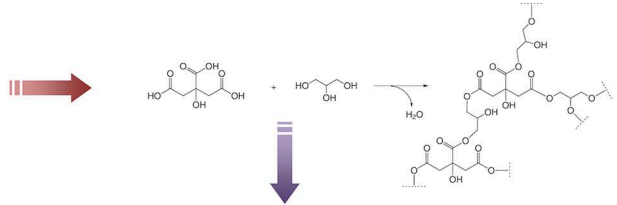
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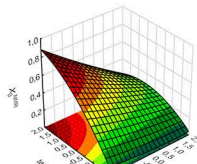
The **PURPOSE** of this work was to obtain poly(glycerol citrate) to produce nonwovens by mixing it with polylactide.

## design of experiments

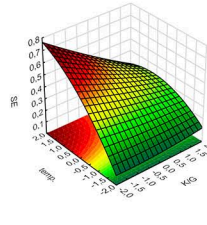
Variable	Lower limit value	Experimental area					Upper limit value
		Lower "star point"	(0,00)	(1,00)	Upper "star point"	(1,41)	
Citric acid/glycerol molar ratio	0.2	0.3	0.5	1.0	1.5	1.7	5.0
Temperature [°C]	100.0	113.8	120.0	135.0	150.0	156.2	170.0



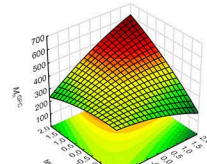
$$X_1^{0.988} = 0.186 - 0.057 \left(\frac{T}{100}\right) - 0.021 \left(\frac{X_1}{0.2}\right)^2 + 0.0257 - 0.0267^2 - 0.023 \left(\frac{T}{100}\right)^2$$



$$X_1^{0.988} = 0.420 - 0.089 \left(\frac{T}{100}\right) - 0.005 \left(\frac{X_1}{0.2}\right)^2 + 0.1227 - 0.0337^2 - 0.038 \left(\frac{T}{100}\right)^2$$



$$SE = 0.404 - 0.055 \left(\frac{T}{100}\right) + 0.004 \left(\frac{X_1}{0.2}\right)^2 + 0.1067 - 0.0267^2 - 0.033 \left(\frac{T}{100}\right)^2$$



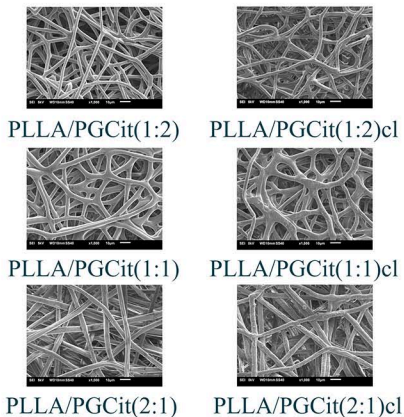
$$M_v^{0.988} = 408.000 + 25.110 \left(\frac{T}{100}\right) - 8.463 \left(\frac{X_1}{0.2}\right)^2 + 41.9207 - 8.4637^2 + 34.750 \left(\frac{T}{100}\right)^2$$

## ELECTROSPINNING

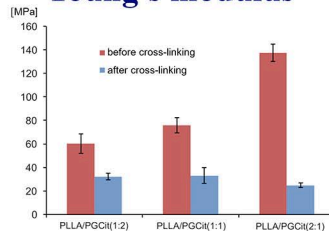
**material:** polymer blend poly-L-lactide/poli(glycerol citrate) mass ratio 1:3

**cross-linking:** under reduced pressure; 3 x 24h: room temperature --- 40°C --- 80°C

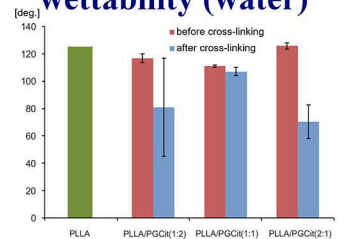
## morphology



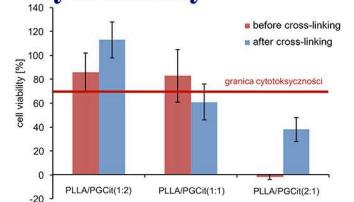
## Young's modulus



## wettability (water)



## cytotoxicity



## SUMMARY

- \*process parameters affect product properties
- \*max SE - highest temperature, excess of glycerol (within the tested area)
- \*poly(glycerol citrate) hydrophilises the nonwovens surface
- \*no cytotoxicity when acid content is lower

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