

# Polyesters-based nanoparticles for enhancing usnic acid bioavailability



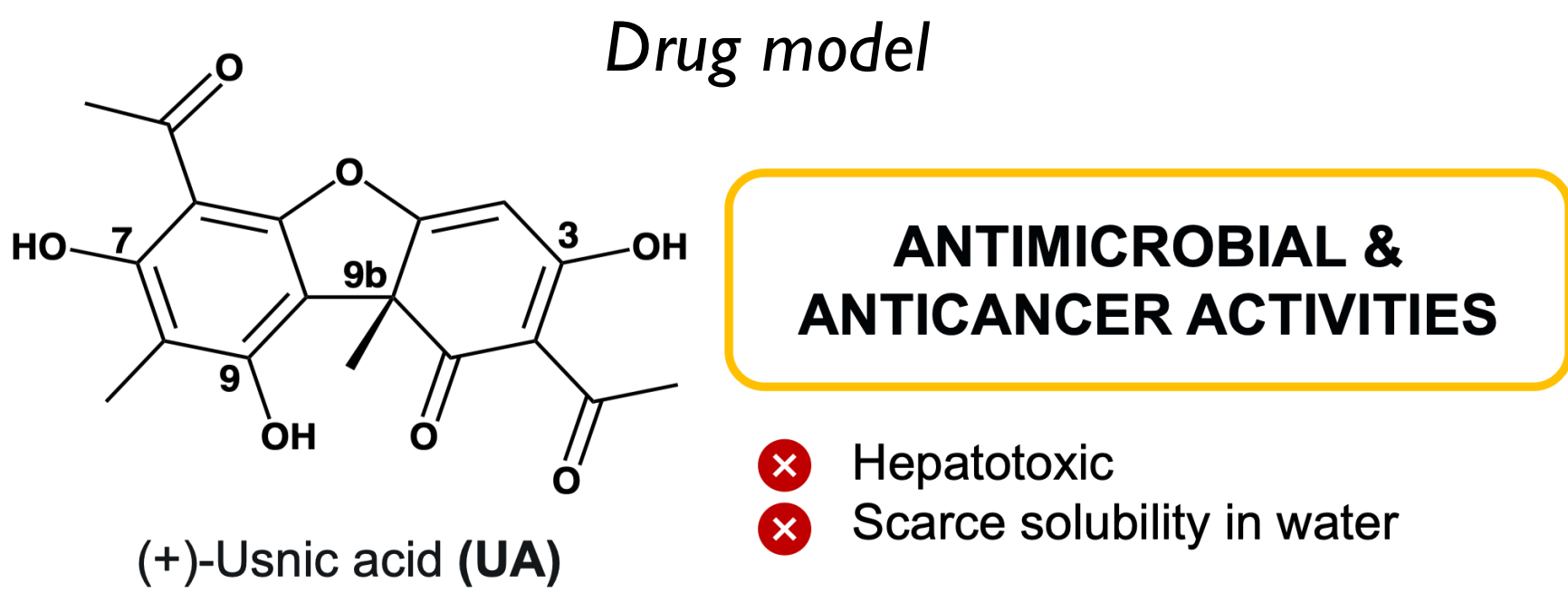
B. Brugnoli<sup>1</sup>, G. Perna<sup>1</sup>, C. Frezza<sup>1</sup>, A. Del Giudice<sup>1</sup>, L. Galantini<sup>1</sup>, A. Piozzi<sup>1</sup>, A. Mariano<sup>2</sup>, A. Scotto d'Abusco<sup>2</sup>, E. Axioti<sup>3</sup>, V. Taresco<sup>3</sup>, I. Francolini<sup>1</sup>

<sup>1</sup> Department of Chemistry, Sapienza University of Rome, P.le Aldo Moro 5, Rome, Italy  
<sup>2</sup> Department of Biomedical Sciences, Sapienza University of Rome, P.le Aldo Moro 5, Rome, Italy  
<sup>3</sup> School of Chemistry, University of Nottingham, NG7 2RD, Nottingham, UK

## Introduction

Linear aliphatic polyesters, such as poly-L-lactide (PLLA), have garnered considerable attention as nanocarriers in drug delivery due to their biocompatibility and biodegradability. The main disadvantages of these polymers are the lack of functional groups and high crystallinity degree that may negatively affect drug loading and polymer degradation rate [1].

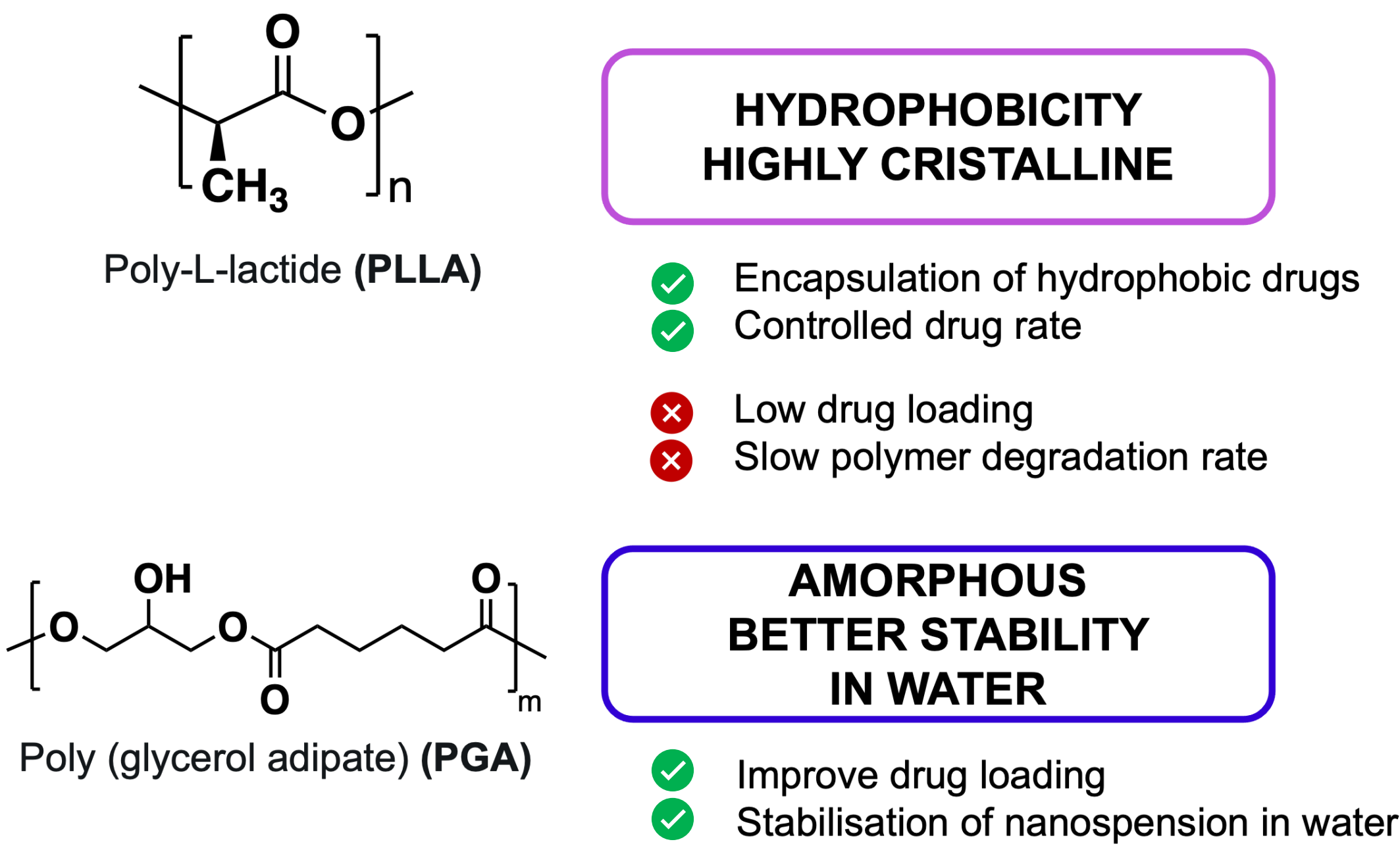
We chose to use usnic acid which is a quite interesting active pharmaceutical ingredient thanks to its antimicrobial and anticancer activity.



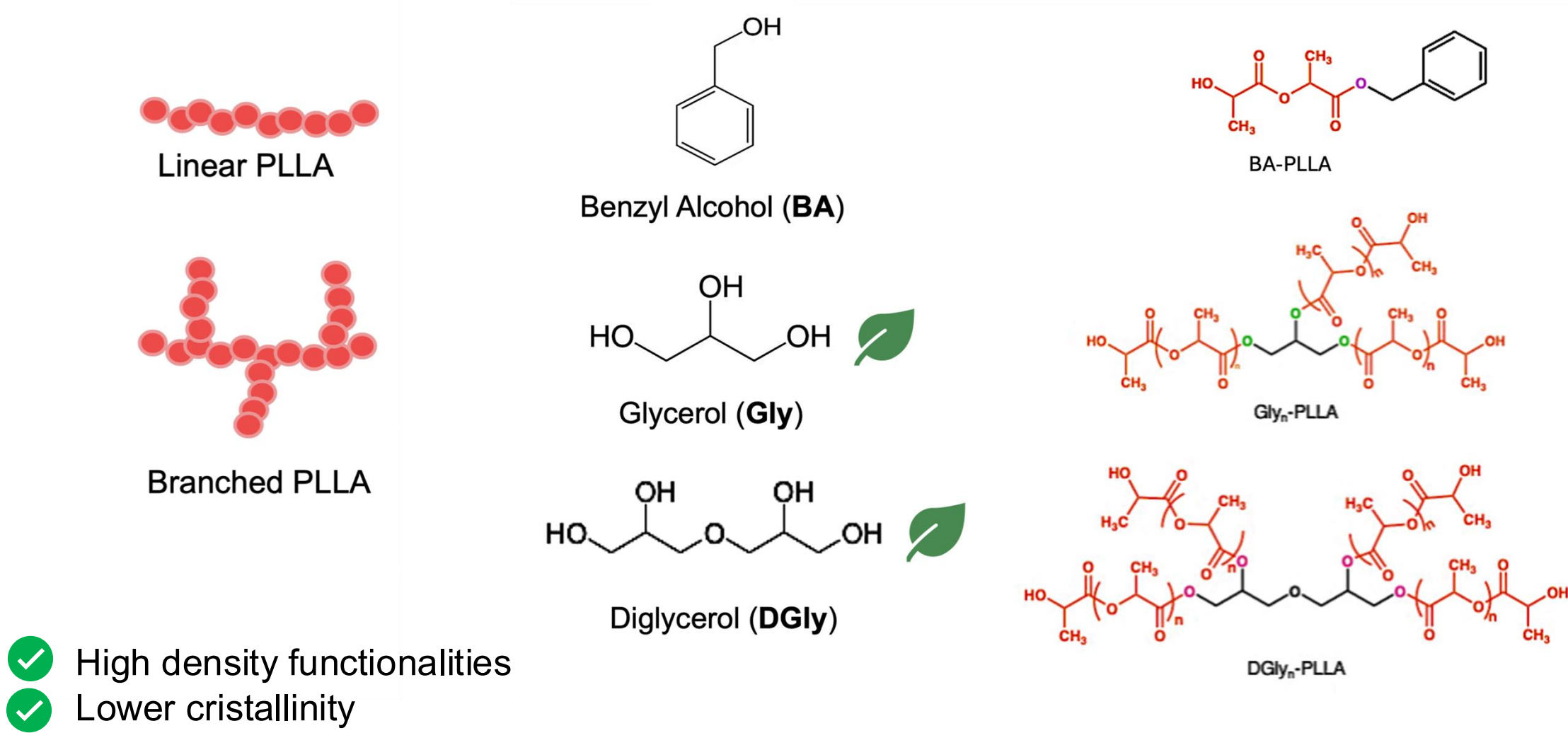
However, its application in the pharmaceutical field it's limited because of UA low solubility in water and high hepatotoxicity.

## Our strategies

### 1 Blending PLLA/PGA

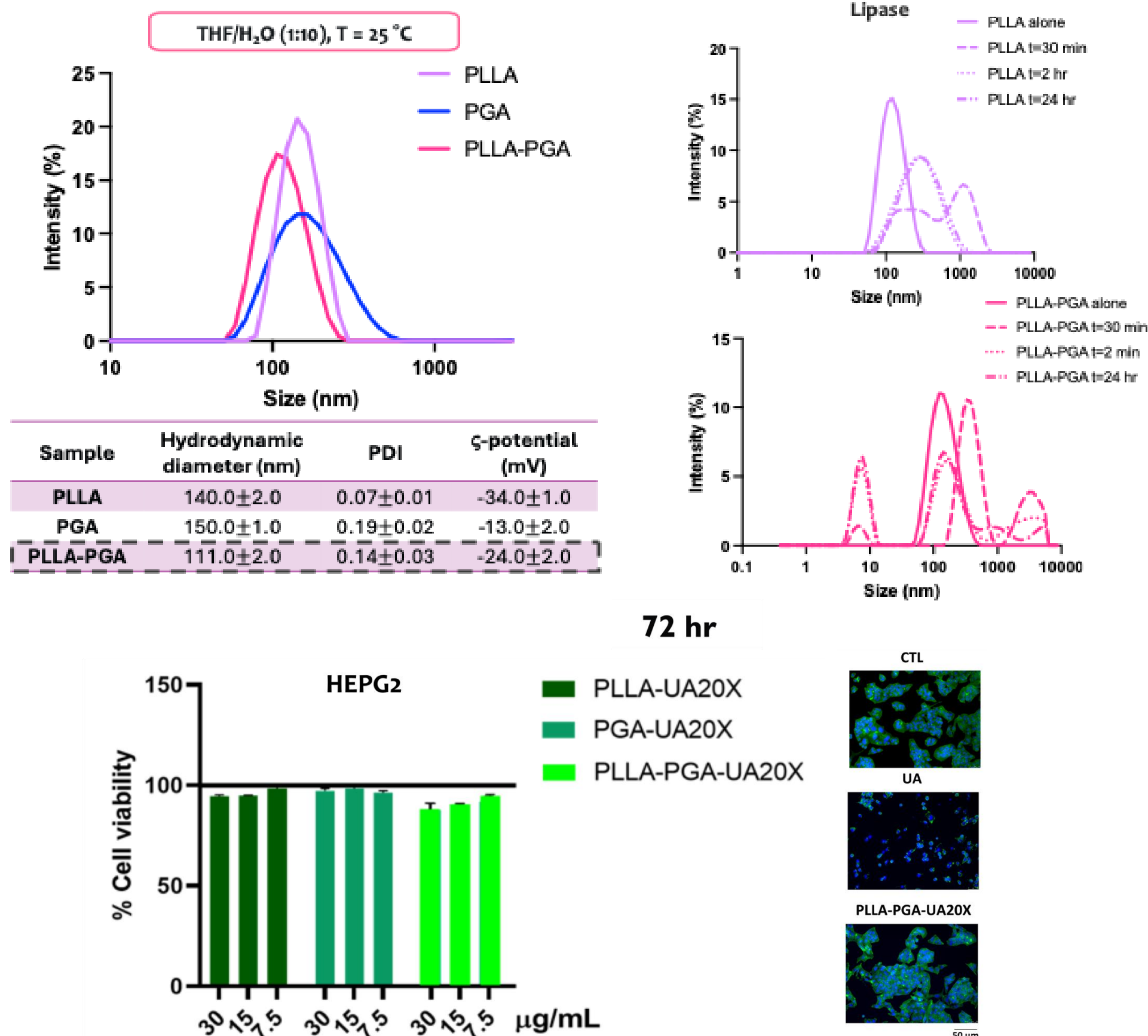


### 2 Branched PLLA based on renewable polyols

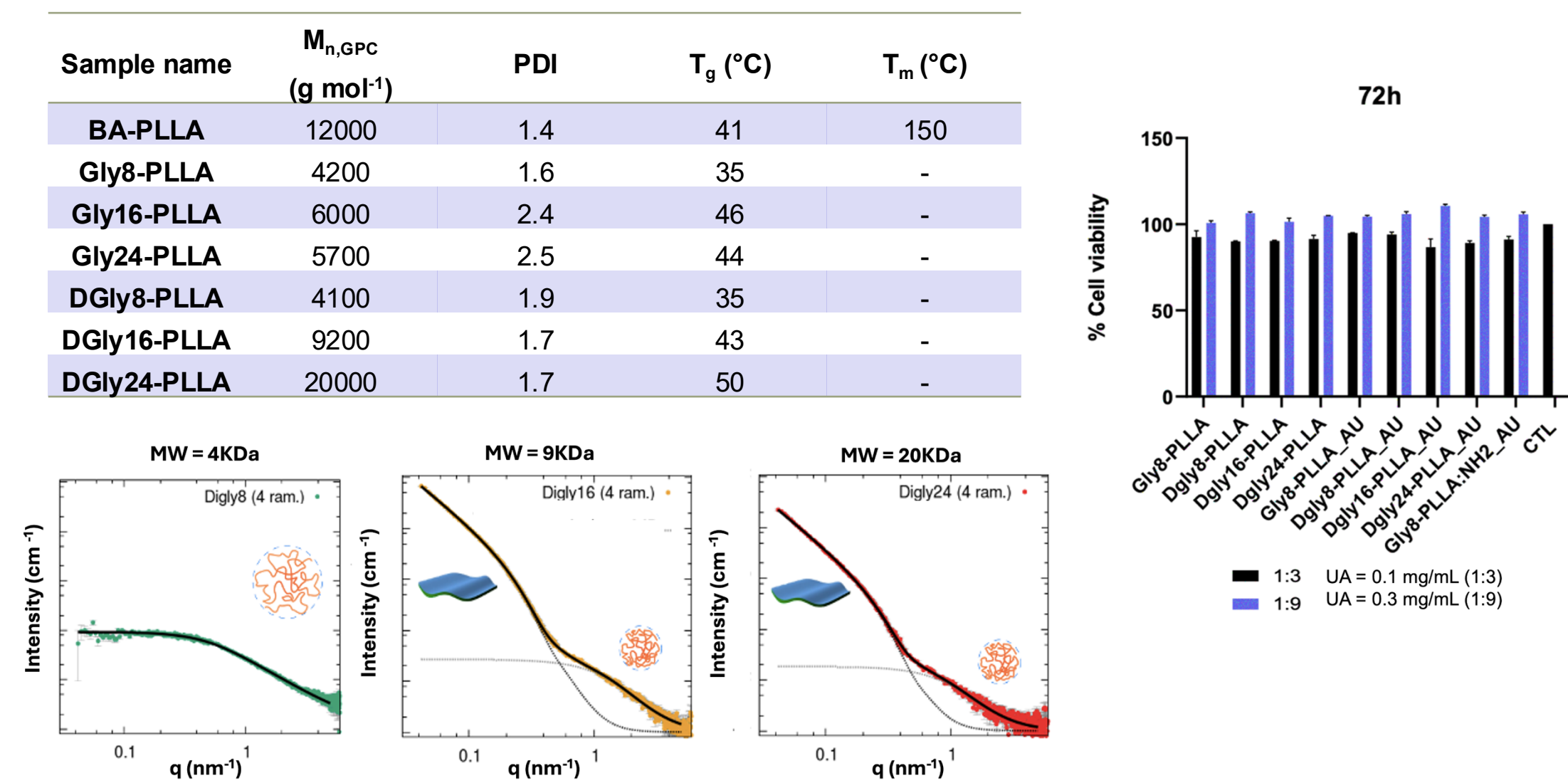


## Results

### 1 Blending PLLA/PGA



### 2 Branched PLLA based on renewable polyols



## References

[1] Washington, K.E. et al. Recent Advances in Aliphatic Polyesters for Drug Delivery Applications. WIREs Nanomedicine Nanobiotechnology 2017, 9 (4), e1446  
[2] Brugnoli, B. et al. Self-Assembled Chitosan-Sodium Usnate Drug Delivery Nanosystems: Synthesis, Characterization, Stability Studies, in Vitro Cytotoxicity and in Vivo Biocompatibility against 143 B Cells. Carbohydr. Polym. Technol. Appl. 2023, 6, 100373.  
[3] Brugnoli, B. et al. Nanostructured Poly-L-Lactide and Polyglycerol Adipate Carriers for the Encapsulation of Usnic Acid: A Promising Approach for Hepatoprotection. Polymers 2024, 16 (3), 427.