

Nanoparticle Systems for Improved Delivery of Plectranthus-Derived Abietane Diterpenoids in Breast Cancer Therapy

Vera M.S. Isca¹, Gabrielle Bangay^{1,2}, Elizabeth A. Lopes^{1,3}, Rebeca André¹, Jennifer Fernandez Alarcón⁴, Epole Ntungwe⁴, Catarina P. Reis³, Catarina Pereira-Leite¹, Ana M. Díaz-Lanza², Cristina Fornaguera Puigvert⁴, Patrícia Rijo^{1,3*}

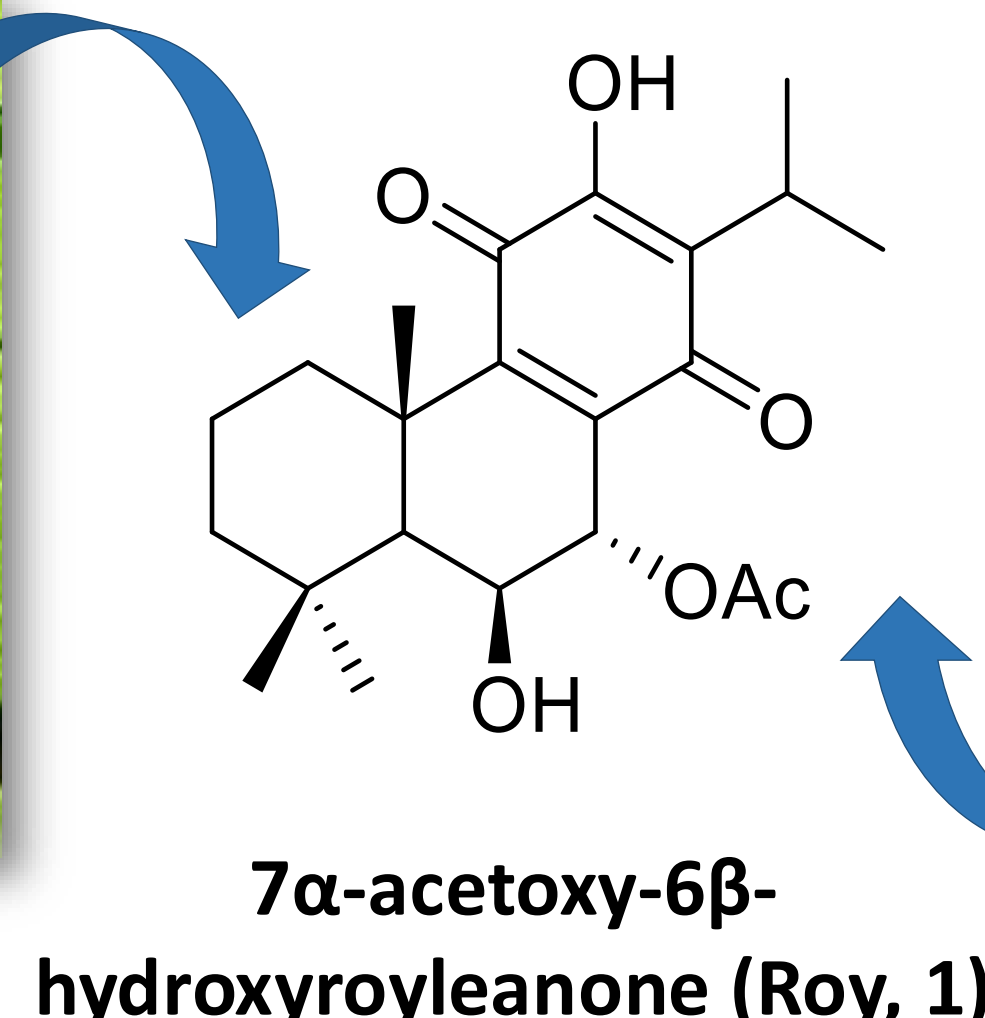
¹ CBIOS – Universidade Lusófona's Research Center for Biosciences & Health Technologies, Lisbon, PORTUGAL; ² Universidad de Alcalá de Henares. Facultad de Farmacia, Departamento de Ciencias Biomédicas (Área de Farmacología; Nuevos agentes antitumorales, Acción tóxica sobre células leucémicas. Alcalá de Henares, Madrid, ESPAÑA; ³ Research Institute for Medicines (iMED.Ulisboa), Faculdade de Farmácia, Universidade de Lisboa, PORTUGAL. ⁴ Grup d'Enginyeria de Materials (GEMAT), Institut Químic de Sarrià (IQS), Universitat Ramon Llull (URL), 08017, Barcelona, ESPAÑA; *corresponding author: patricia.rijo@ulusofona.pt

Introduction

Plectranthus genus (Lamiaceae) - Source of cytotoxic abietane compounds



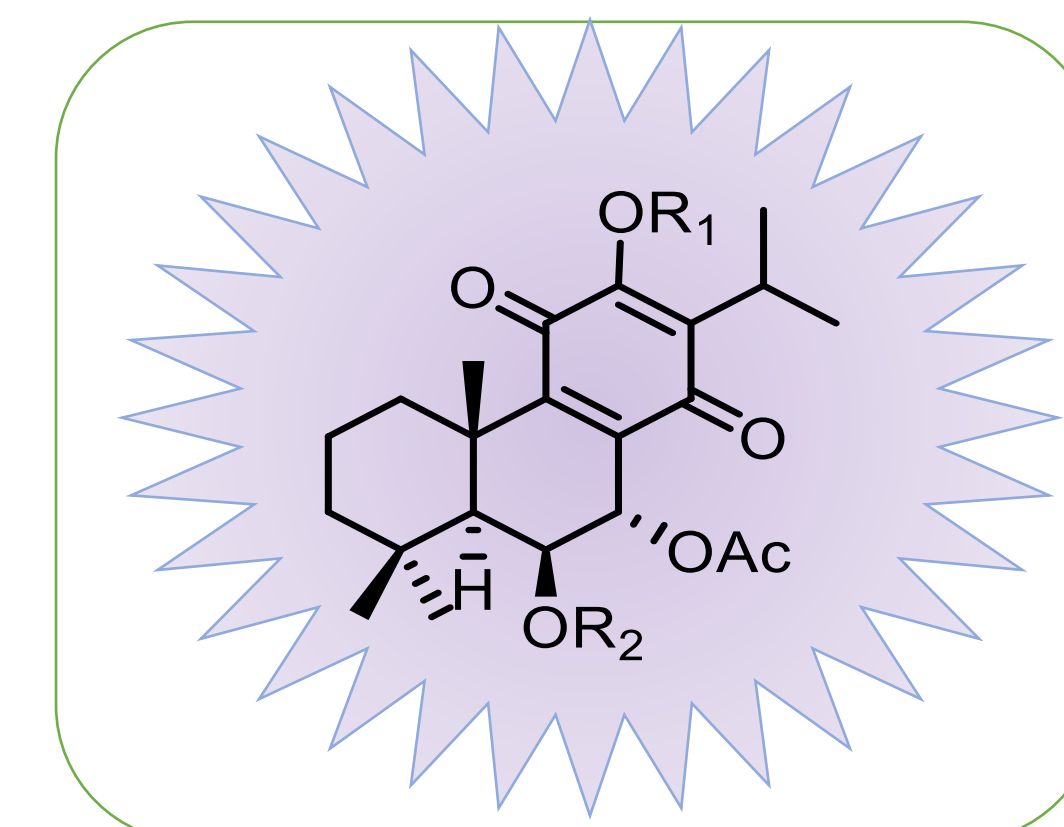
P. grandidentatus
Gürke



P. madagascariensis
(Pers.) Benth



Royleanones are cytotoxic against several cancer cell lines. However, compounds have very **low water-solubility**.

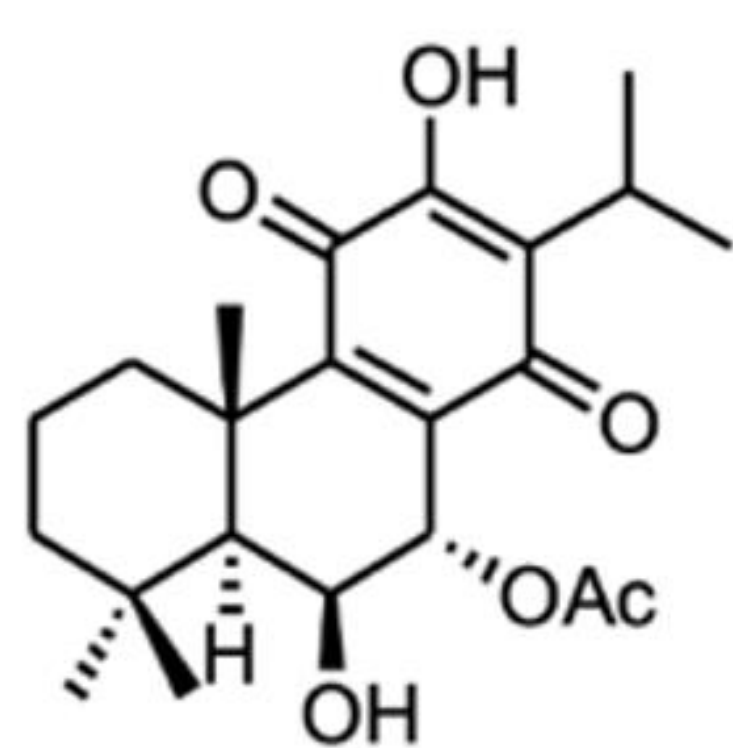


Nanotechnology can be a possible solution to **improve drug solubility** and **targeted delivery** without undesirable side effects.

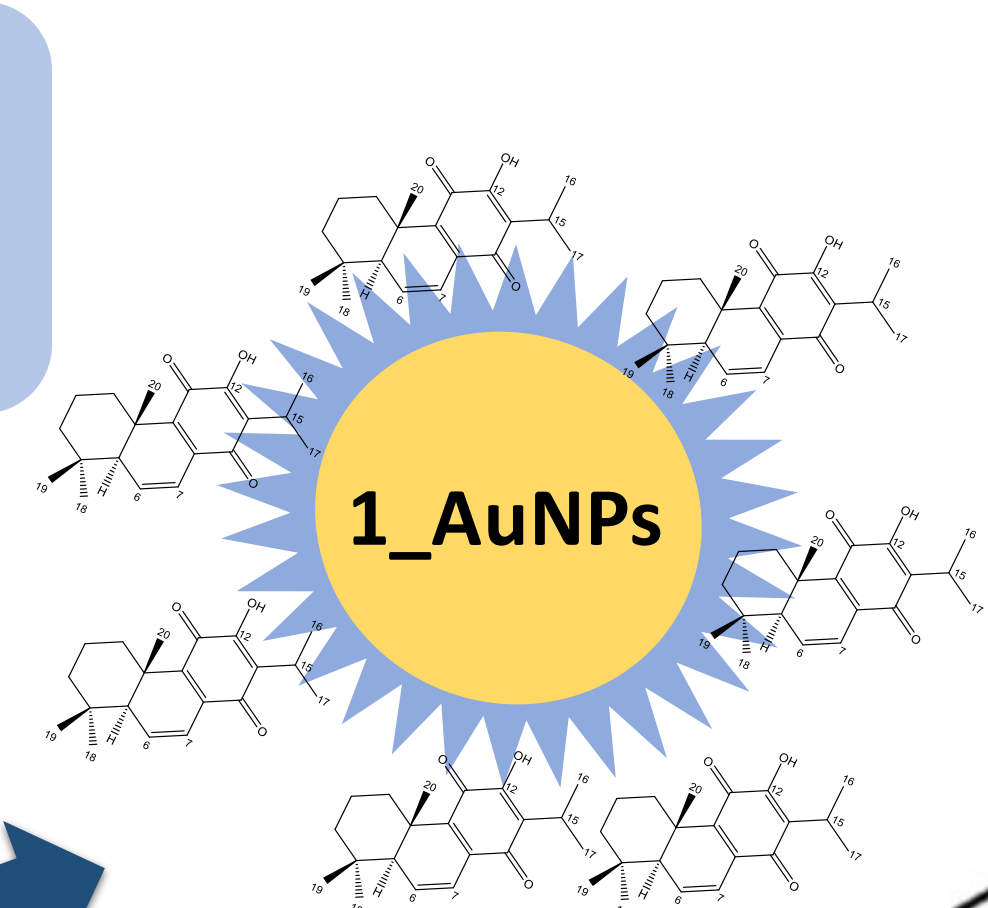
Methodology

In this work, the cytotoxic royleanone, **Roy**, and its ester derivative, were used to prepare gold nanoparticle formulations, to enhance the cytotoxic potential of these drug candidates

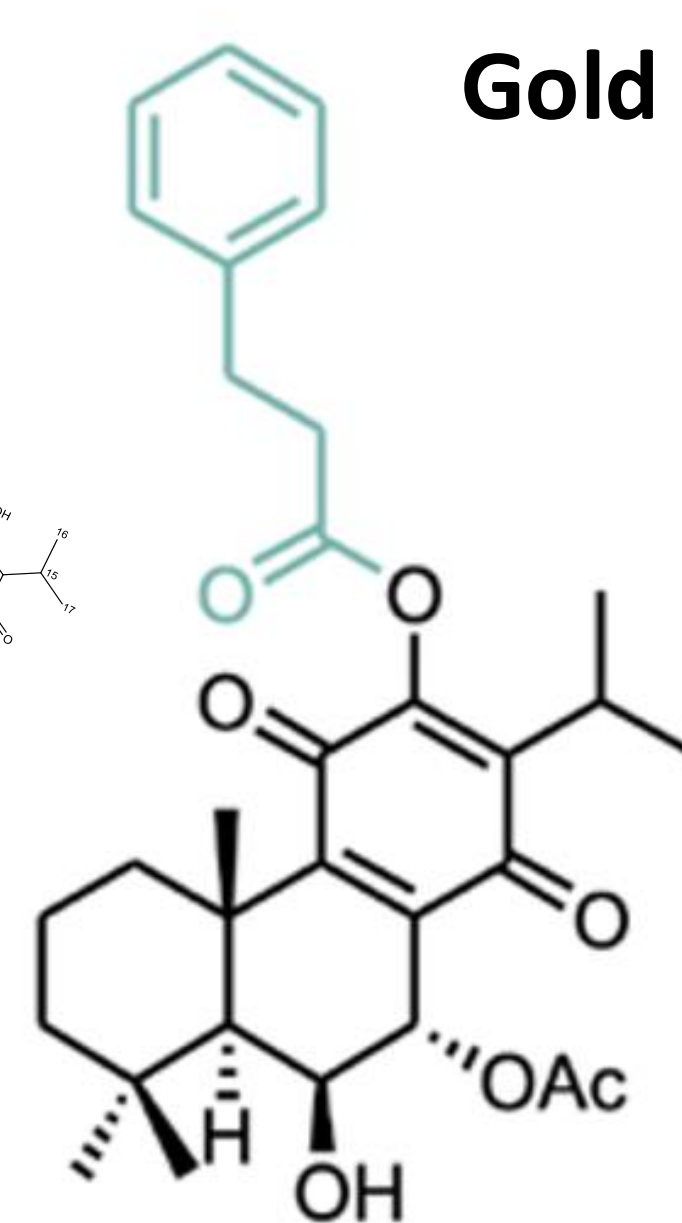
1. Gold Nanoparticles (AuNPs) preparation



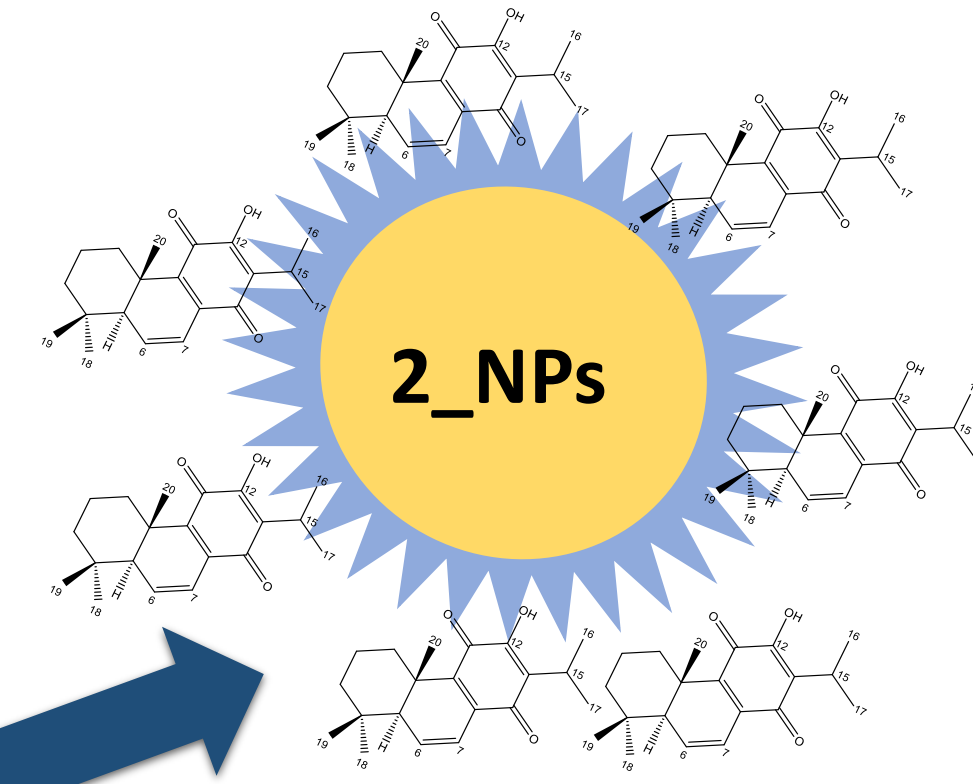
Roy (1)



Gold NPs



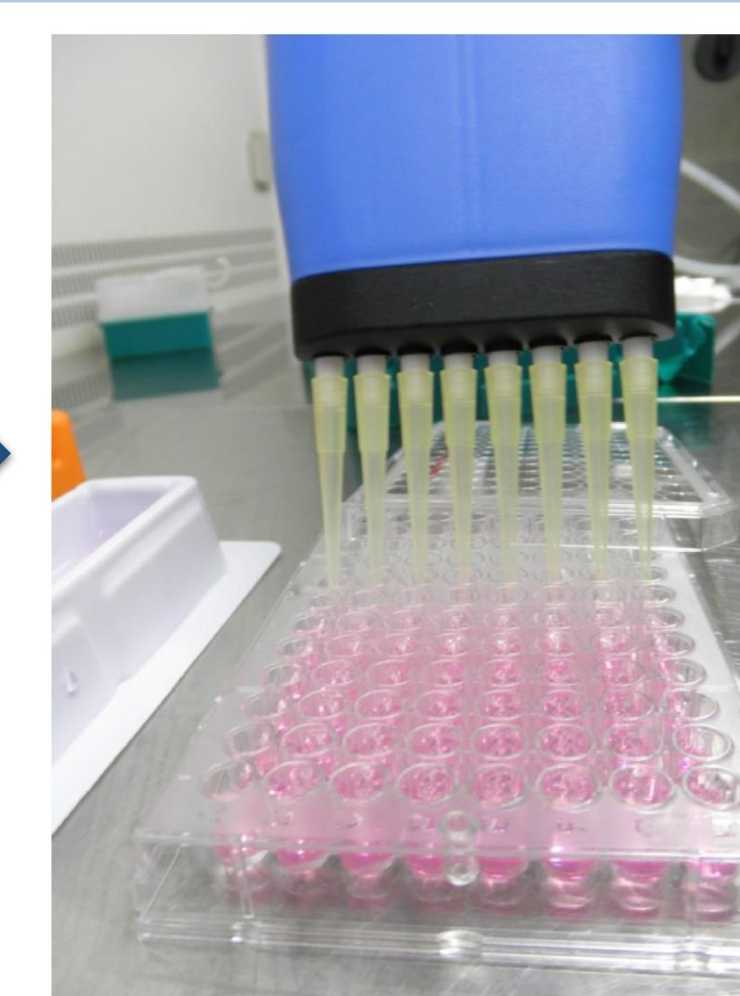
Ester Derivative of Roy (2)



Physicochemical Characterization

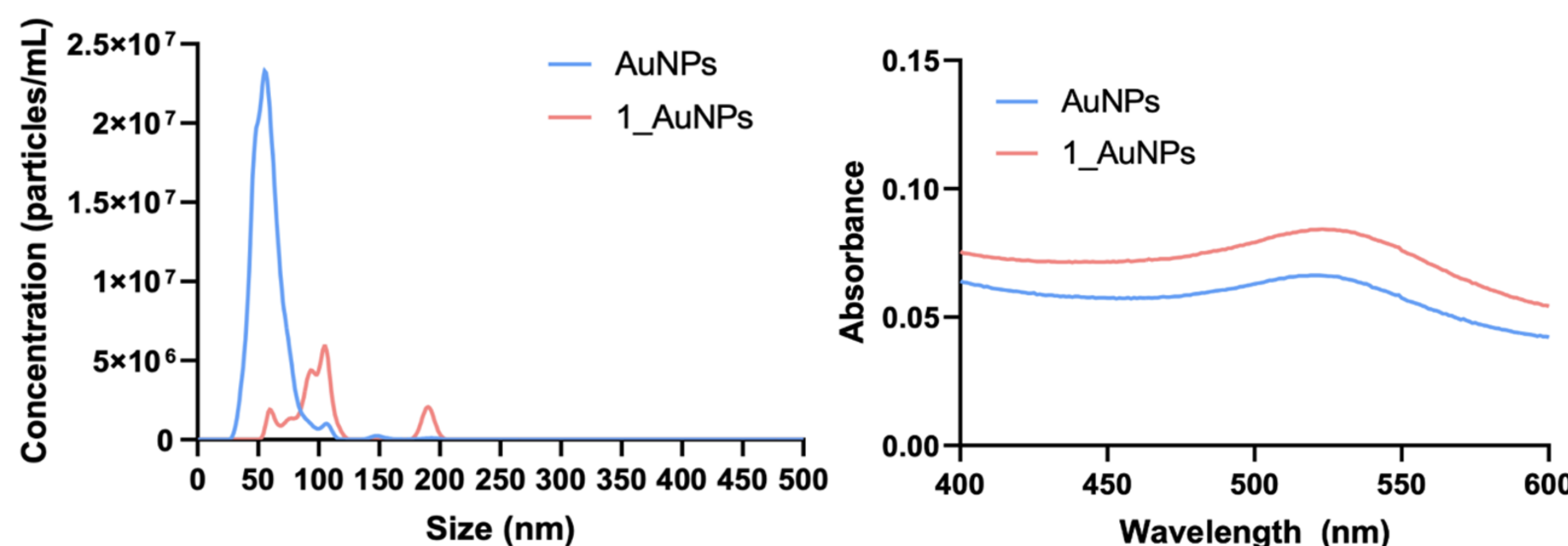
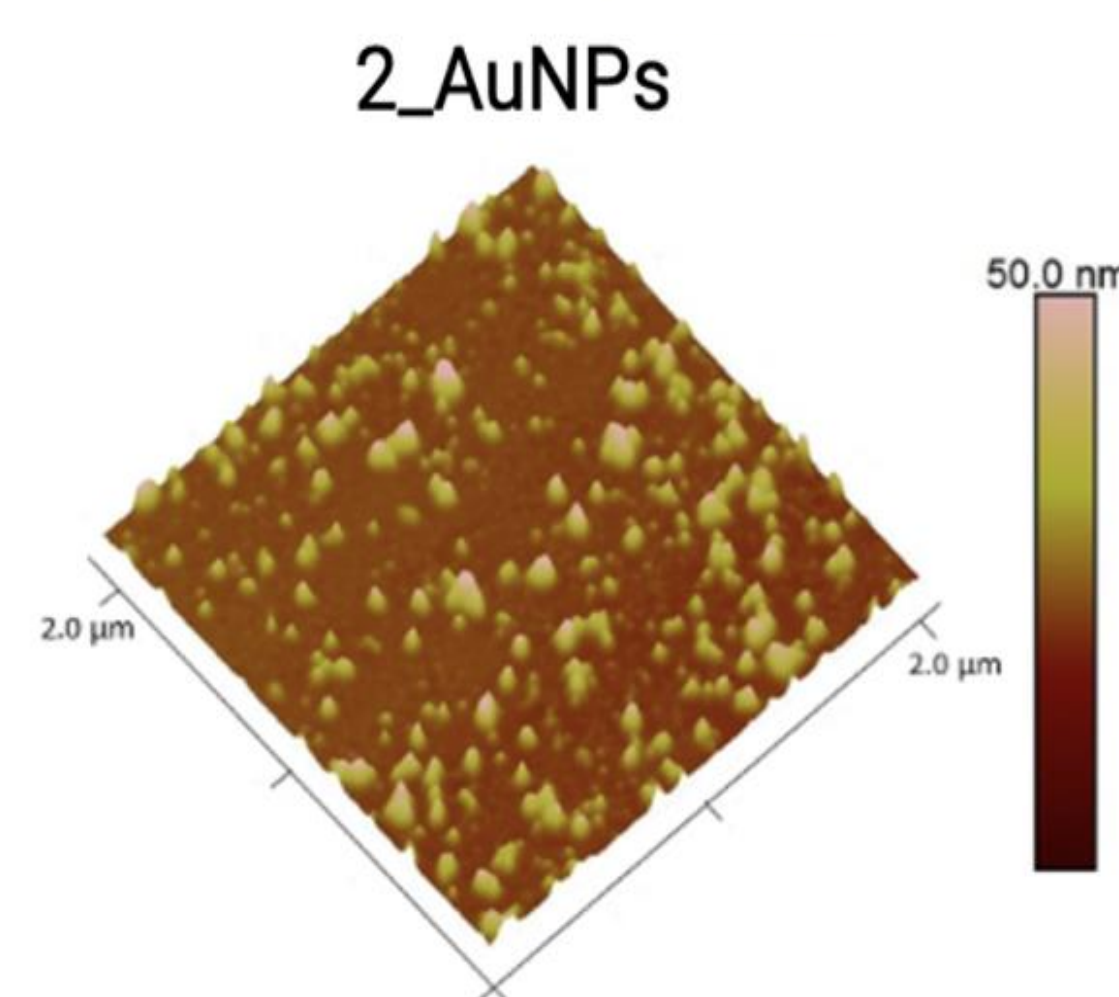
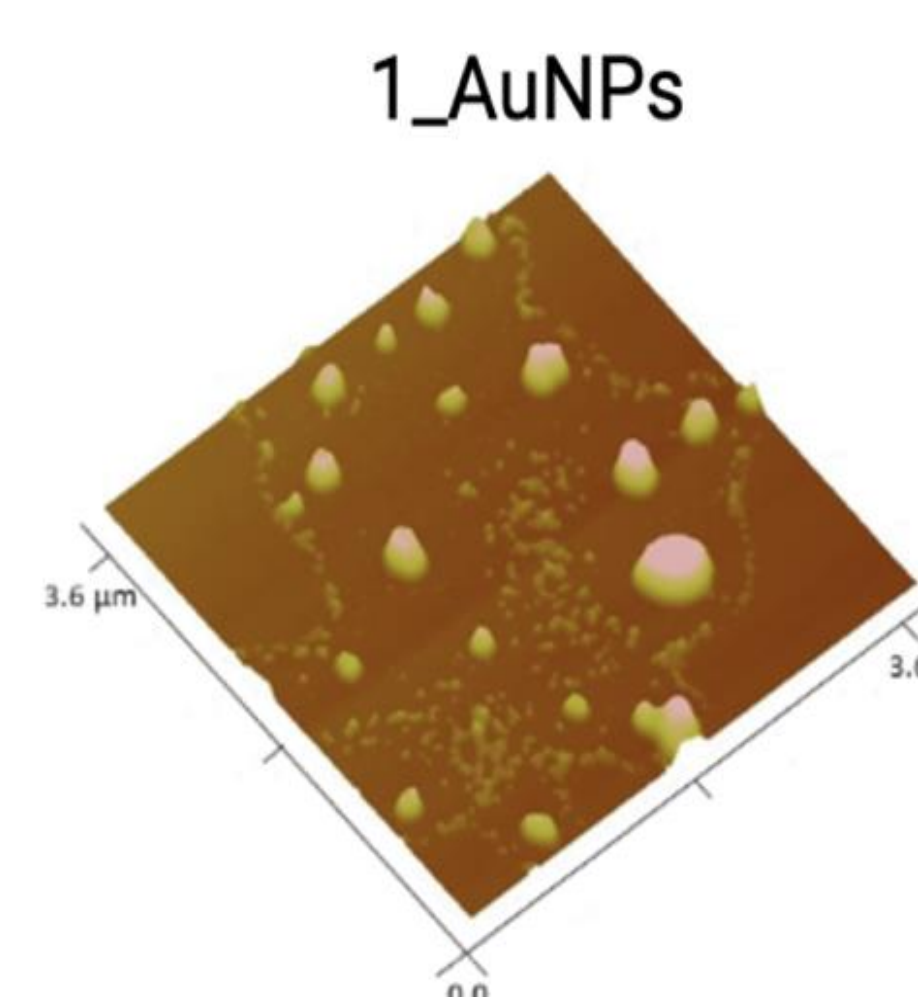
AuNPs evaluated for particle size, polydispersity index (PDI), surface charge (zeta potential), and drug encapsulation efficiency

2. Cytotoxicity Evaluation



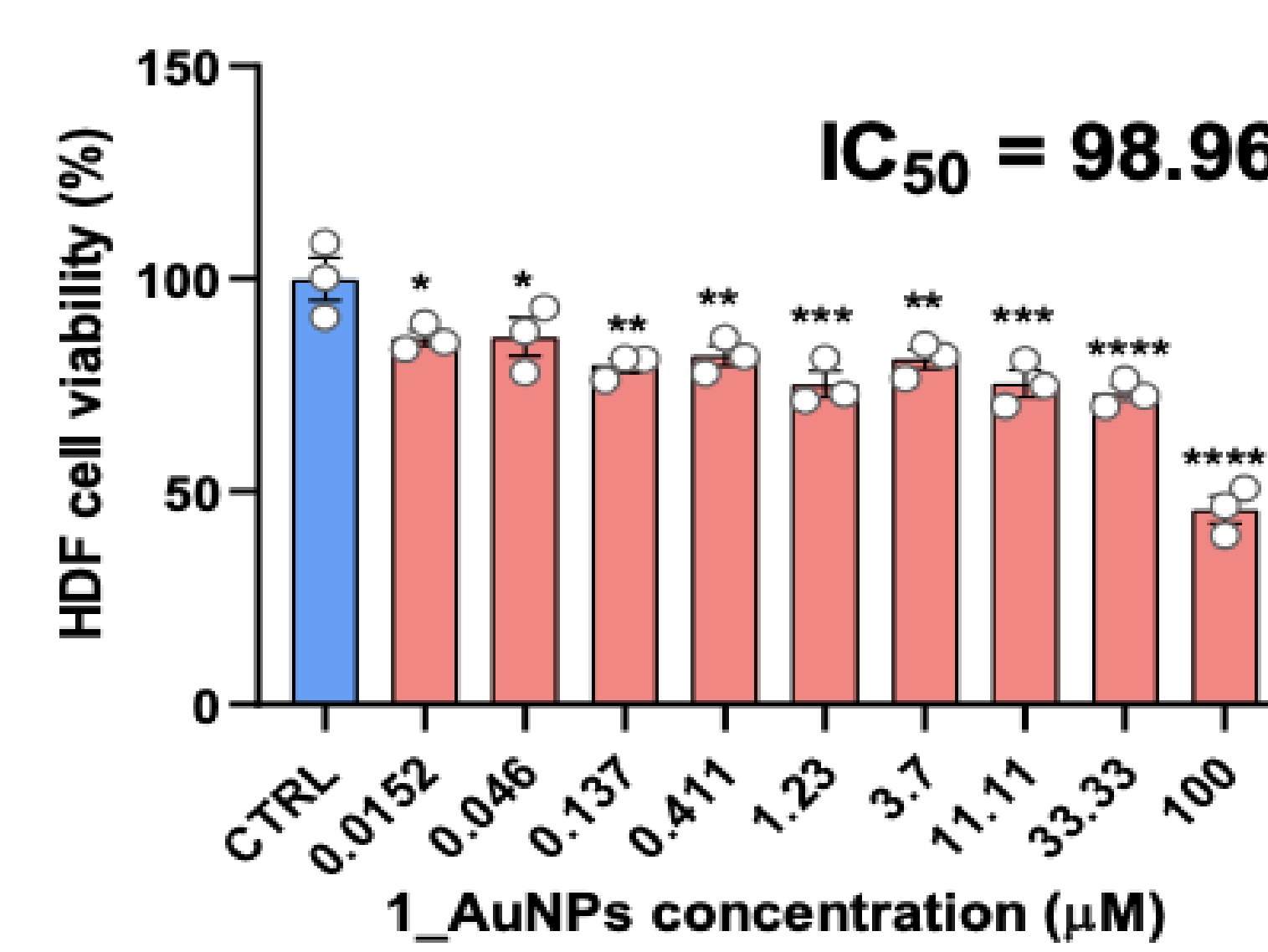
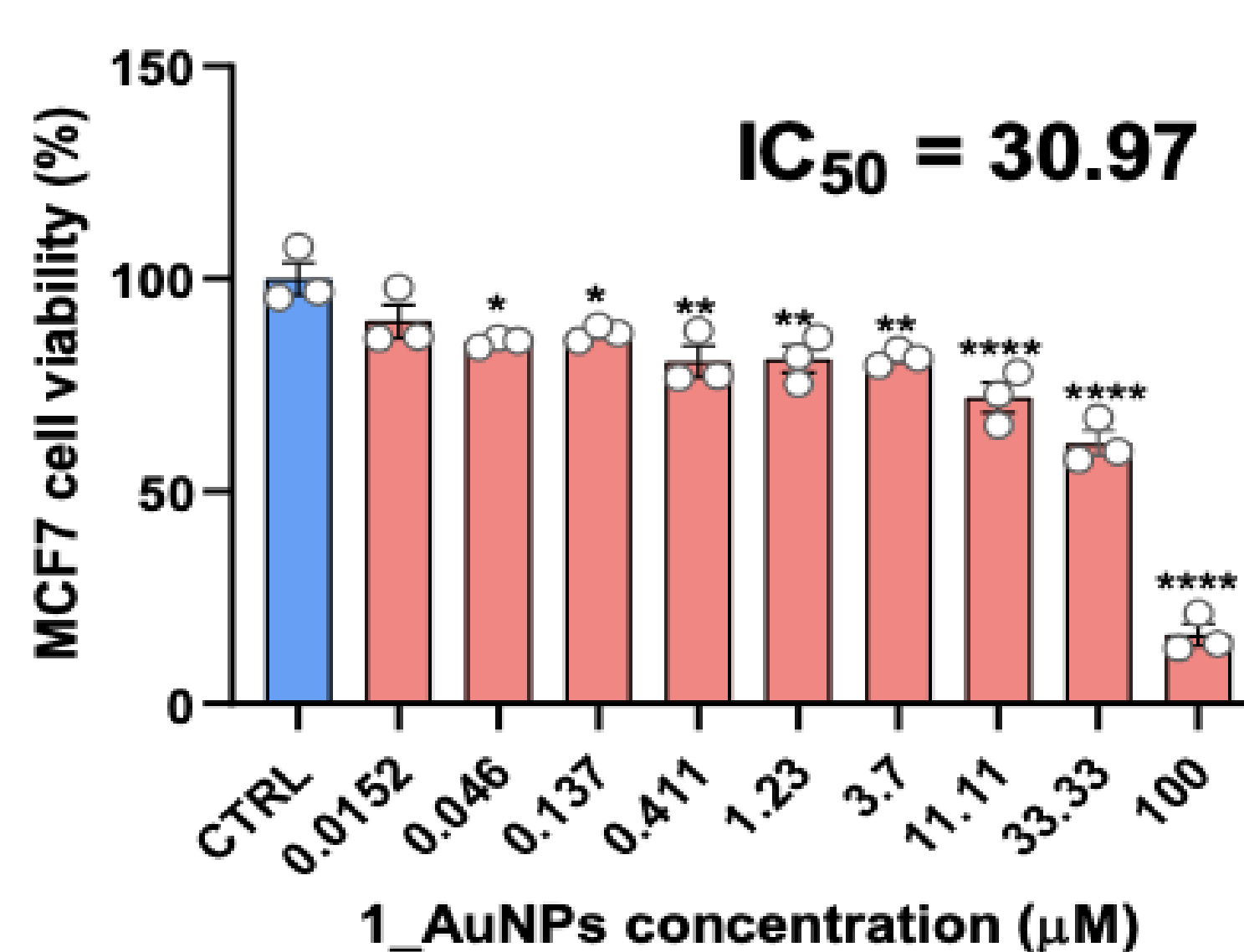
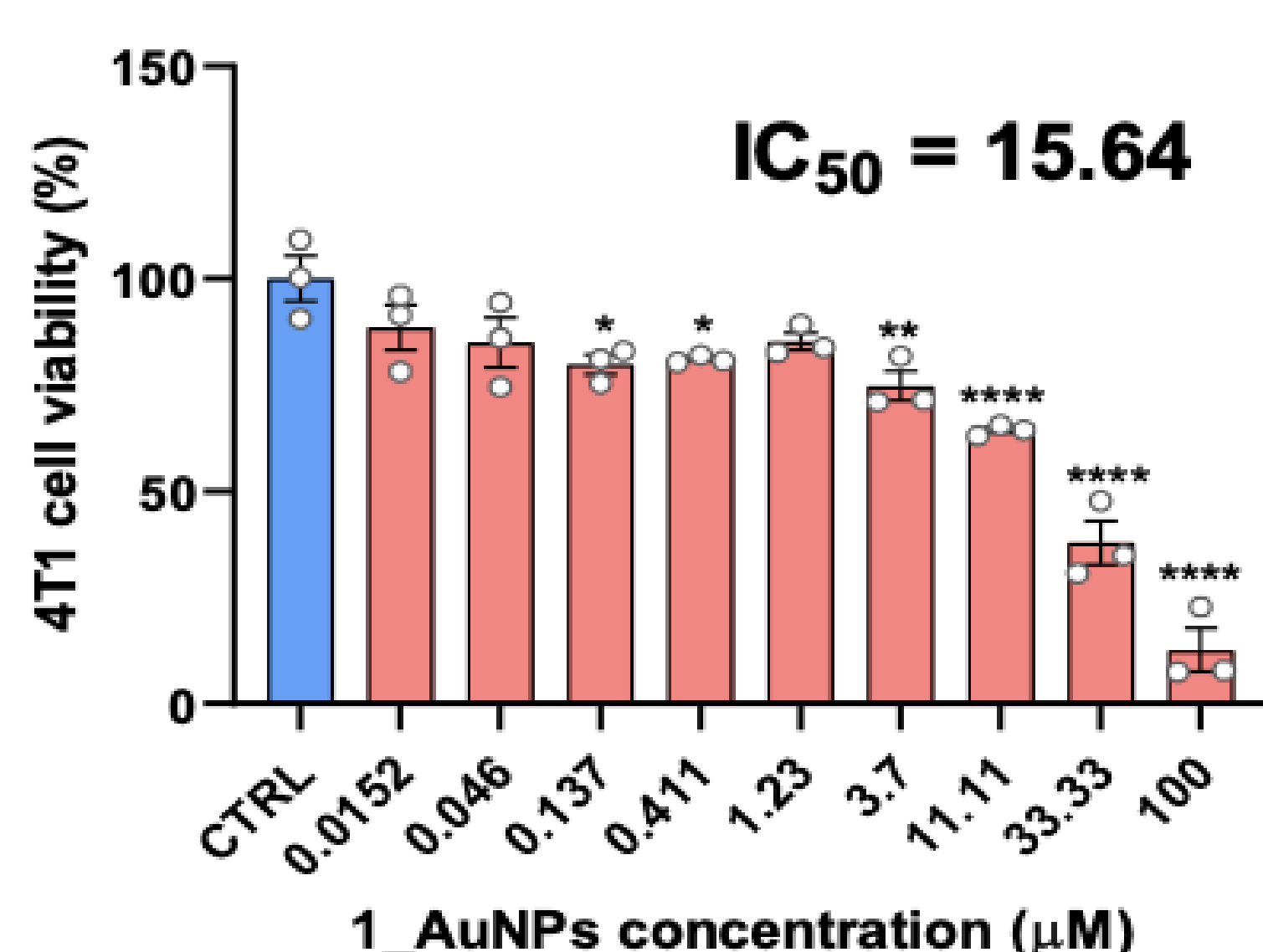
Results

AFM images revealed particles with **spherical shapes** for 1_AuNPs



Average size of conjugated **1_AuNPs** and unconjugated **AuNPs** using NTA; UV-VIS spectra showing slight shift in absorbance.

1_AuNPs cytotoxic in 4T1 and MCF7 cancer cell lines



Conclusion

- ✓ Nanosystems using natural and semi-synthetic royleanones successfully prepared
- ✓ **1_AuNPs** sustained cytotoxic activity of **Roy** when assessed in cancer cell lines
- ✓ **1_AuNPs** allow for targeted delivery of cytotoxic abietane
- ✓ **1_AuNPs** are selective against cancer cells, while sparing normal HDFs cells

1_AuNPs not cytotoxic in normal human dermal fibroblasts (HDF)

Acknowledgments

This work was financially supported by Fundação para a Ciência e a Tecnologia (FCT) through projects DOI 10.54499/UIDP/04567/2020, DOI 10.54499/UIDB/04567/2020, UI/BD/151422/2021

References

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- [2] Ntungwe, E. et al. 2021, Int J Mol Sci, 22 (19).