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LOCAL CHEMOTHERAPY PLATFORM WITH CONTROLLED AND PROLONGED DRUG RELEASE FOR THE PREVENTION OF LOCAL TUMOR RECURRENCE

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INTRODUCTION & AIM

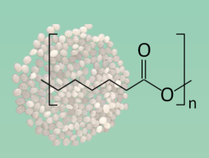
Surgical treatment of tumors followed by adjuvant chemotherapy is one of the most common and standard protocols for the treatment of early-stage cancer. However, local recurrence is still a major problem in clinical practice. The development of recurrence reflects **the ineffectiveness** or **inadequacy of existing therapies**.

The success of sustained release formulations has demonstrated that **prolonged exposure to drugs at moderate concentrations increases the efficacy of therapy** and reduces the likelihood of resistance development.

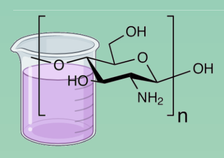
Aim of work: To create a localized chemotherapy platform that provides controlled and uniform drug release from the platform over several months by varying deposition parameters.

Scientific novelty: Achievement of the most prolonged drug release (more than 5 months) and levelling of explosive kinetics in similar studies on chemotherapy delivery systems.

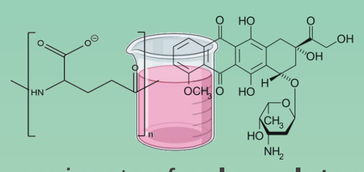
MATERIALS



polycaprolactone (PCL)

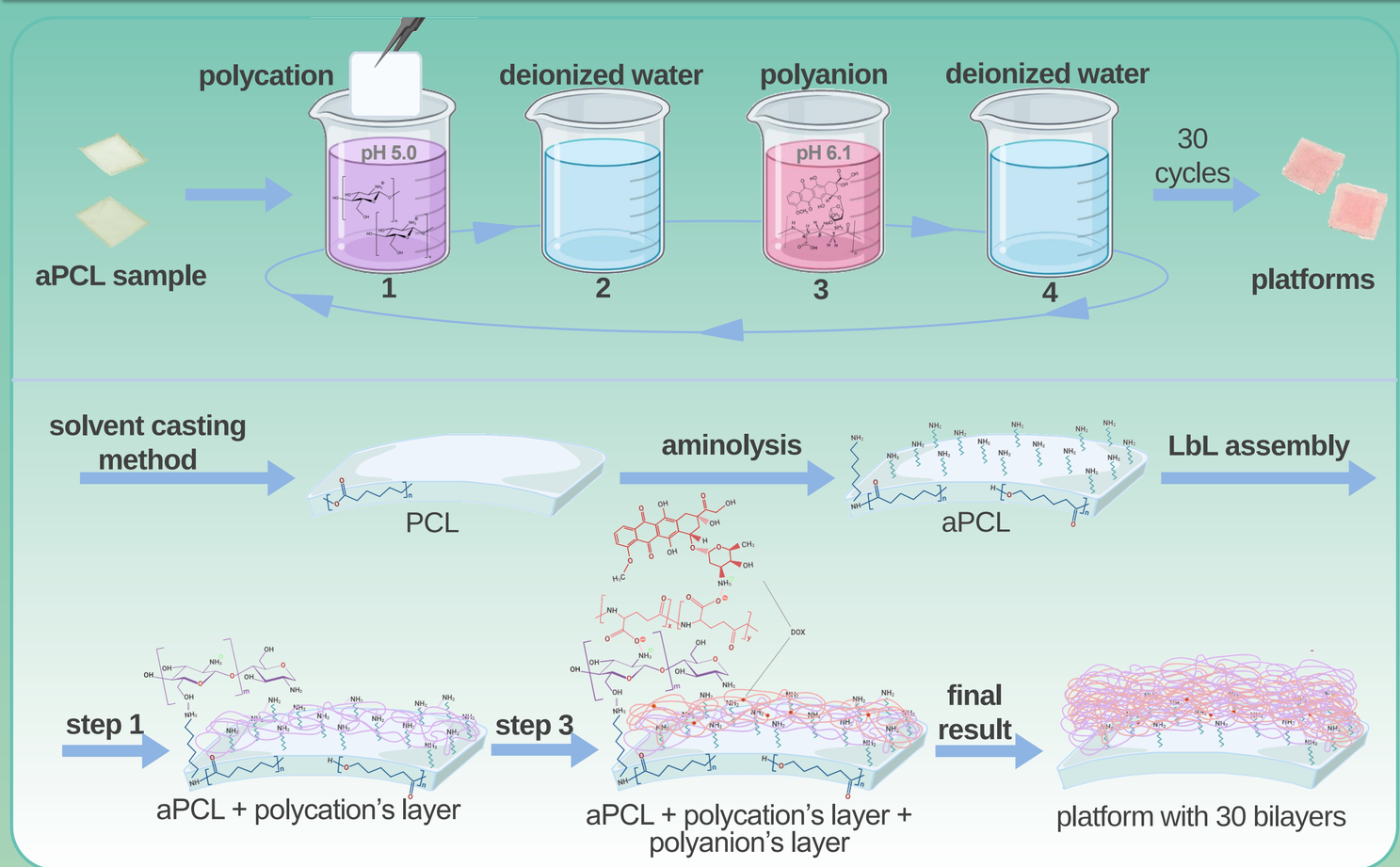


chitosan (polycation)

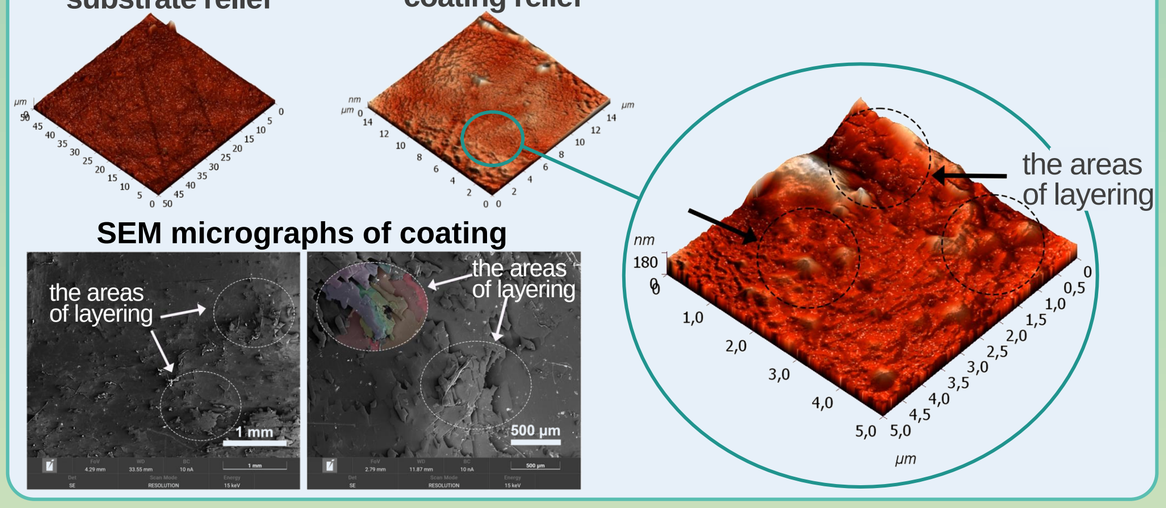


ionic conjugate of **poly-γ-glutamic acid** and **doxorubicin** (polyanion)

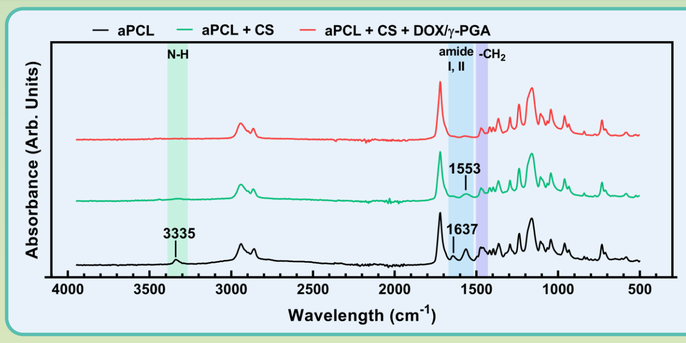
METHOD

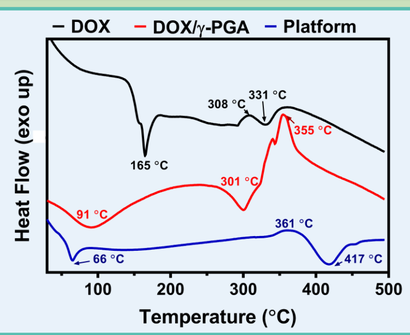


AFM and SEM

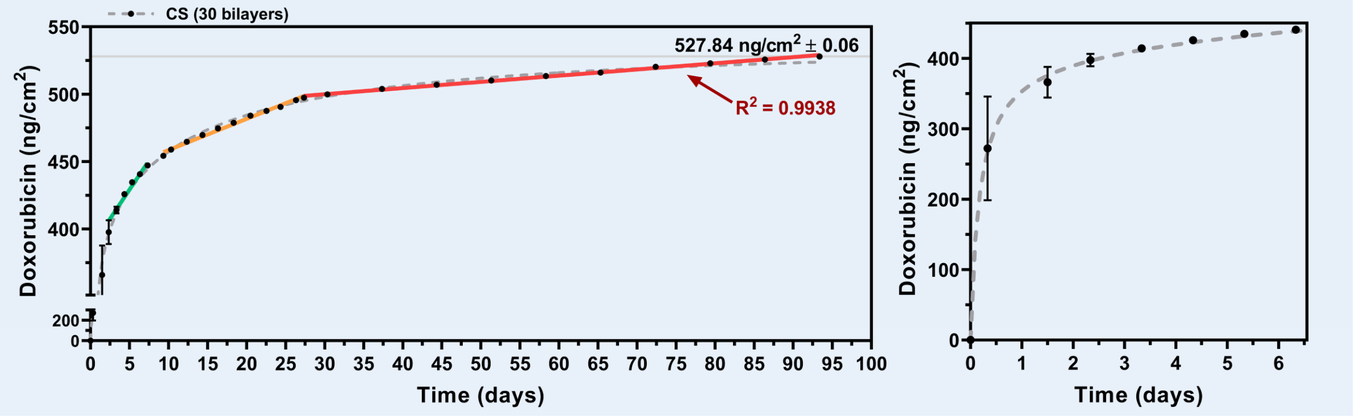


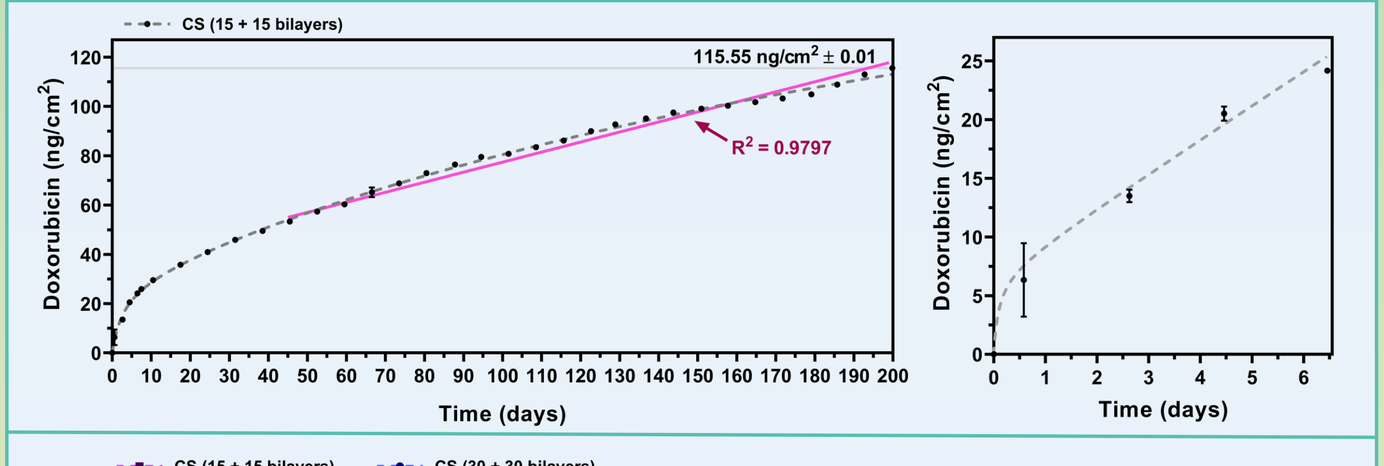
FTIR and DSC

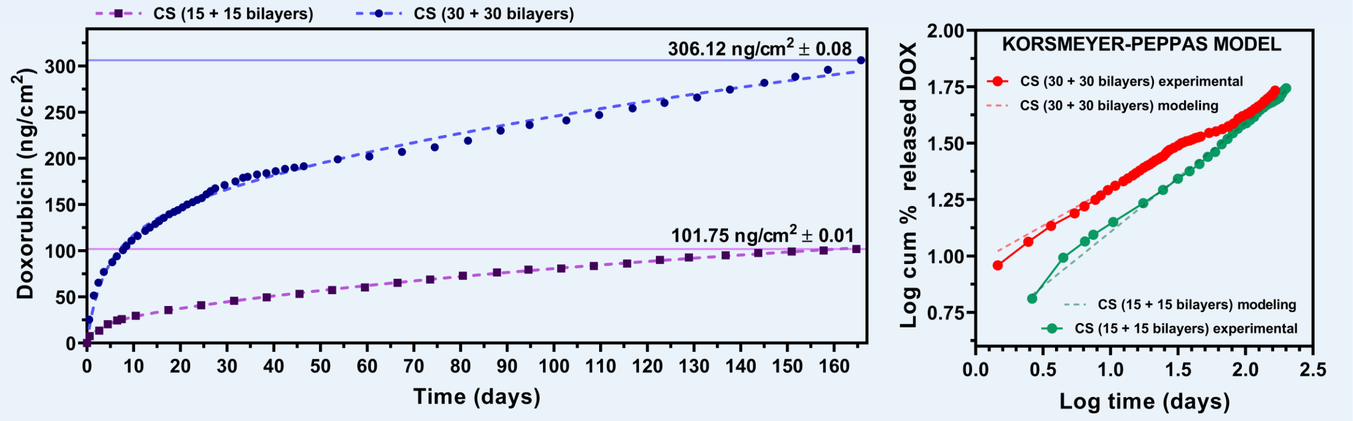




EFFECT OF COATING STRUCTURE ON DOX RELEASE KINETICS

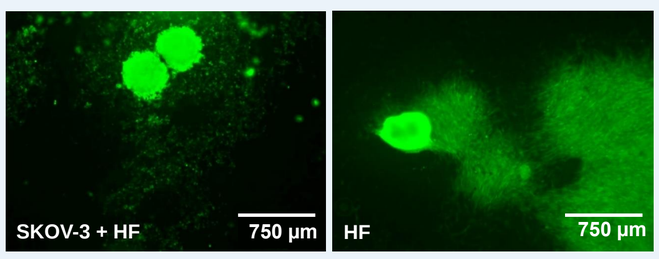


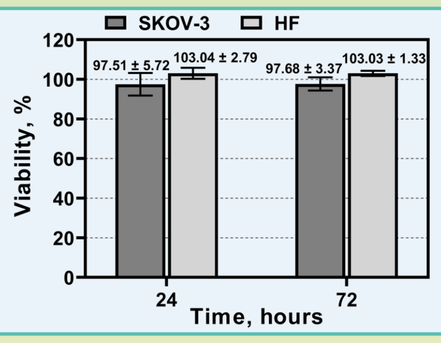




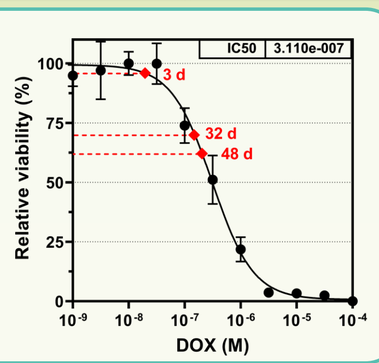
Type of platform	Type of bilayers	DOX content, ng/cm²	Amount of released DOX on day 150, %
CS (30 bilayers)	$(CS+DOX/γ\text{-}PGA)_{30}$	580.0 ± 0.9	-
CS (15 + 15 bilayers)	$(CS+DOX/γ\text{-}PGA)_{15}$ + $(CS+γ\text{-}PGA)_{15}$	208.6 ± 4.2	47.51 ± 1.5
CS (30 + 30 bilayers)	$(CS+DOX/γ\text{-}PGA)_{30}$ + $(CS+γ\text{-}PGA)_{30}$	566.6 ± 7.9	50.88 ± 2.1
PLL (30 + 30 bilayers)	$(PLL+DOX/γ\text{-}PGA)_{30}$ + $(PLL+γ\text{-}PGA)_{30}$	256.9 ± 5.1	97.09 ± 0.6

CYTOCOMPATIBILITY & CYTOTOXICITY





DOX ACTIVITY ASSESSMENT *in vitro*



CONCLUSION

By varying the deposition structure and the number of coating layers, a fairly **uniform and prolonged release of the drug** was achieved *in vitro* for 6 months with a weekly yield of 3 ng/cm². The kinetics of drug release from the platforms was well described by the Korsmeyer-Peppas model and was based on a **diffusion-controlled mechanism**.