Title: Biocompatible polymer-exfoliated nanosheets with ultra-high drug loading as safe and efficacious cancer therapeutics

He Zhang[1], Zi Gu[1]

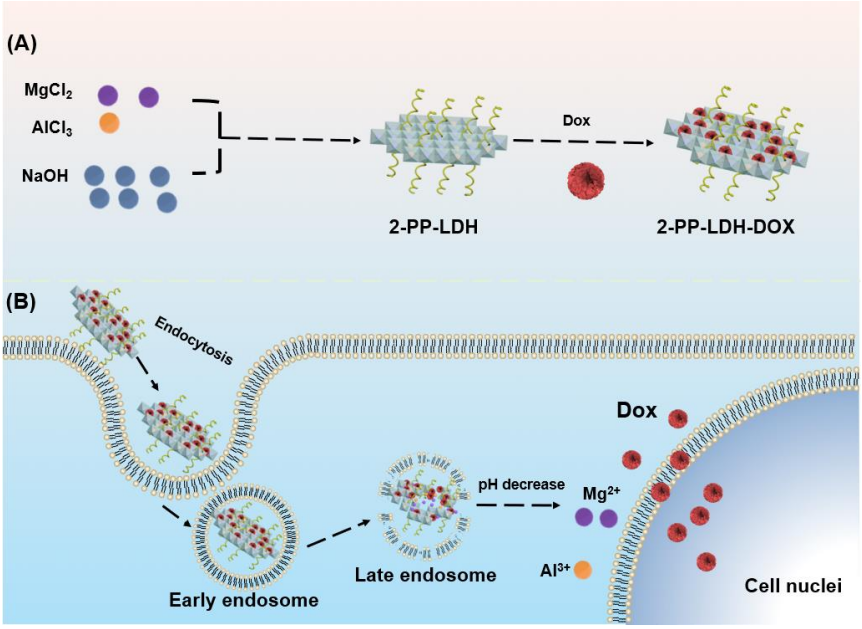
[1]School of Chemical Engineering and Australian Centre for NanoMedicine (ACN), University of New South Wales, Sydney, NSW, 2052, Australia

KEYWORDS: *layered double hydroxides, ultrathin nanosheets, biocompability, drug delivery, chemotherapy*

I. Abstract

Two-dimensional (2D) layered double hydroxide (LDH) nanoparticles have been widely studied for biomedical applications due to its tremendously biocompatible properties at the nanoscale. Exfoliating LDH nanoparticles into ultrathin nanosheets is an efficient way to maximize the utility of each single layer, which possess the higher specific surface area. However, current exfoliation methods of LDH nanoparticles are either time-consuming or lack of biocompatibility (bottom-up method), which remains a bottleneck for biomedical applications of LDH nanosheets. Herein, we developed a novel and rapid method to synthesis ultrathin LDH nanosheet with a thickness of around 3nm via bottom up method. In this work, the modified Poly (ethylene glycol) (PEG) is not only successfully applied as layer inhibitor to urge the formation of LDH nanosheet, but also acted as a surfactant to improve its biocompability, making this ultrathin LDH nanosheet an excellent candidature for drug delivery system. Comparted with pristine LDH nanoparticles, this nanosheets show a good colloid stability among different artificial biological solutions. It is also featured with superb drug loading capacity and loading efficiency of universal anticancer drug doxorubicin (DOX). This nanosheet loaded DOX also exhibit a pH-controlled DOX releasing manner, indicating a good tumour selectivity. Additionally, both *in vivo* and *in vitro* results reveal the excellent anticancer activity and superior biocompatibility of the DOX loaded nanosheet. overall, this work provides a potential strategy of modifying functional LDH nanosheet for its bioapplication in drug delivery system.

II. Figures



III. Biography

He Zhang is a second year PhD candidate in the major of Chemical engineering at University of New South wales. His research maily focous on desgining 2D nanomaterilas towards efficient drug delivery system



Presenting author details
Full name: He Zhang
Contact number: +61 0 451826687
Twitter account: HeZHANG13
Linked In account: HeZHANG13
Session name/ number:
Category: (Oral presentation/ Poster presentation) Oral presentation