Studies of the stability and drug release properties of layered double hydroxide with albumin coating

Yujing Qian, Li Li* and Zhi Ping Xu*

Australian Institute for Bioengineering and Nanotechnology, The University of Queensland, Australia. Email: z.xu@uq.edu.au; l.li2@uq.edu.au

Layered double hydroxide (LDH) nanoparticles have been considered as a promising carrier to efficiently deliver drugs and gene to the target tissues due to their unique properties. The colloidal stability of LDHs has been improved by albumin pre-coating strategy developed in our group. However, the release of drug or gene molecules encapsulated in LDH coated by albumin (BSA) has not been determined and the coated albumin stability on LDHs in high concentration of protein environments has not been studied, which is a critical factor for drug/gene delivery using LDH NPs. As shown in Fig. 1, BSA coating has improved the colloid stability of LDH NPs in PBS and culture medium.

In this study, we have prepared BSA-coated LDH-5FU nanoparticles (Fluorouracil, 5-FU, is an anticancer drug) using BSA pre-coating strategy, and then investigated 5-FU release profile from LDH-5FU and BSA-LDH-5FU. BSA coating seems not to affect the release of 5FU from LDH interlayer. The albumin affinity for LDHs in high concentration of protein environments was studied using BSA-FITC as the probe albumin. The exchange amount of BSA-FITC from LDHs in high concentration of proteins was determined by measuring FITC concentration in aqueous solution. We found no FITC-BSA protein exchange from LDHs was observed in high concentration of protein environments, suggesting that FITC-BSA proteins can strongly adhere on LDH NPs. Thus, BSA coating strategy is a reliable approach to stabilizing LDH NPs in solution with other serum proteins in our body.

![Figure 1: Particle size distribution of BSA-coated LDH nanoparticles determined by DLS.](image-url)