

Electrochemical deposition to construct nature inspired multilayer chitosan/layered double hydroxides hybrid gel for stimuli responsive release of protein

Pengkun Zhao, Youyu Liu, Ling Xiao, Hongbing Deng, Yumin Du, Xiaowen Shi

School of Resource and Environmental Science and Hubei Biomass-Resource Chemistry and Environmental
Biotechnology Key Laboratory, Wuhan University, Wuhan 430079, China

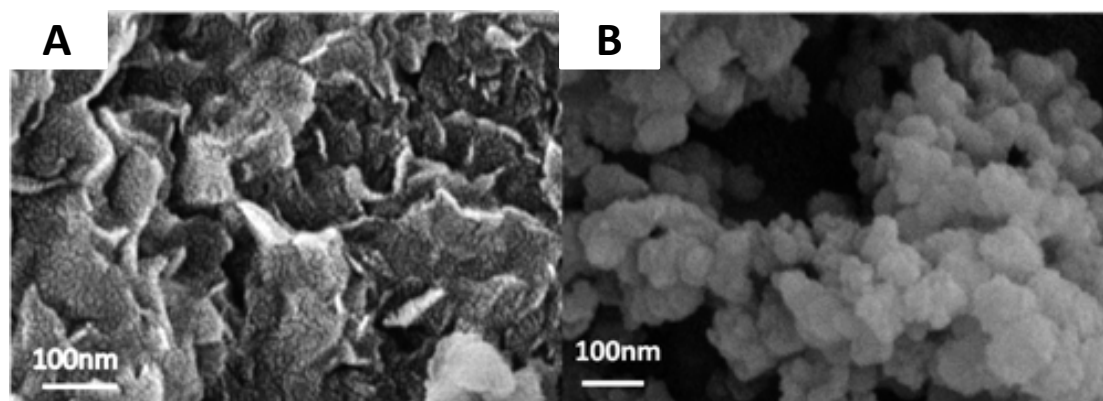


Figure S1. SEM images of NO₃-LDHs (A) and CO₃-LDHs (B).

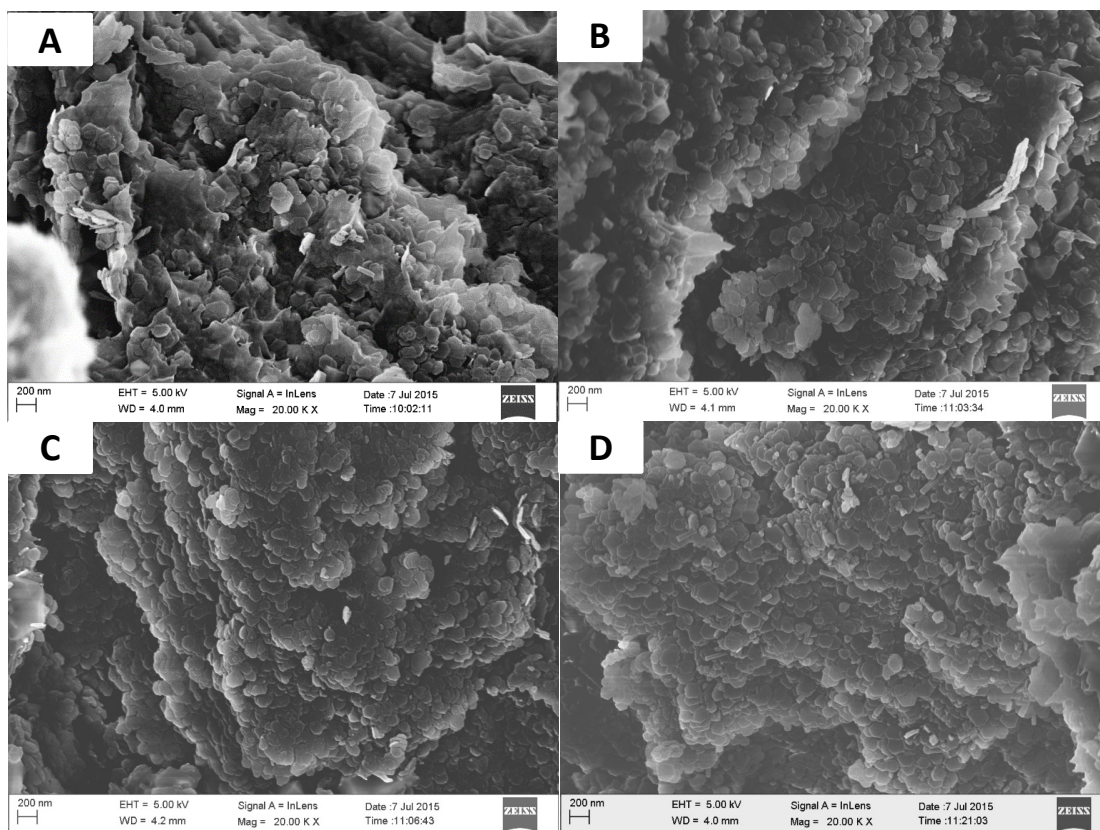


Figure S2. SEM images of chitosan/INS-LDHs hydrogels with mass ratios of:
(A) 3:1; (B) 3:4; (C) 3:5; (D) 1:2.

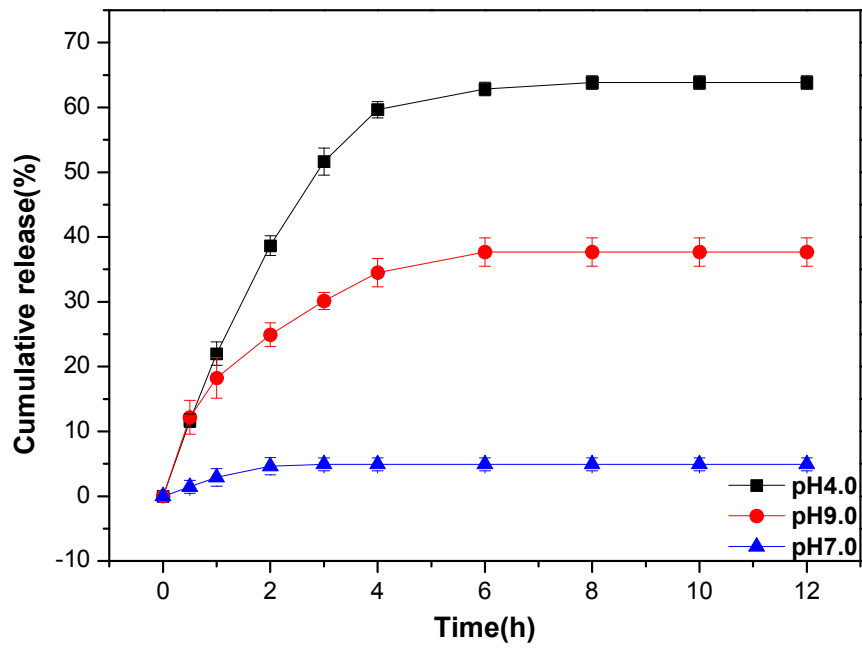


Figure S3. Cumulative release profiles of insulin from chitosan/INS-LDHs hydrogel in 0.9% NaCl solution. The release was performed under different pHs (4.0, 7.0, 9.0) with 0 V voltage applied.

The preparation of NO₃-LDHs and CO₃-LDHs:

NO₃-LDHs was prepared according to a published literature with minor modification.¹ Mg(NO₃)₂·6H₂O (15.39g), Al(NO₃)₃·9H₂O (11.26g) and NaNO₃ (4.25g) were added and dissolved in 280 ml water under N₂ atmosphere. Then diluted ammonia water (6 wt %) was added to the solution at a speed of 25 ml/min till the final pH 9.5. The precipitate was aged for 1.5 h at room temperature and then washed with deionized water. After that, the filter cake was peptized at a constant temperature of 80 °C, formed the positive sol, and dried at 65 °C to get NO₃-LDHs.

CO₃-LDHs was prepared according to a published literature.² Mg(NO₃)₂·6H₂O (19.2g) and Al(NO₃)₃·9H₂O (9.38g) was dissolved in water and this solution was added drop-wise to a basic solution (100 ml) containing 0.05 mol Na₂CO₃. The pH value of the basic solution was kept constant at 11 by adding NaOH solution (3.4 M). The resulting mixture was aged at room temperature for 24 h with continuous stirring. The aged mixture was filtered and washed with deionized water until pH = 7, followed by drying at 100 °C in an oven.

References:

1. Q. Z. Yang, D. J. Sun, C. G. Zhang, X. J. Wang and W. A. Zhao, *Langmuir*, 2003, **19**, 5570-5574.
2. Q. Wang, H. T. Hui, Z. Guo, L. Chen, Y. Liu, J. Chang, Z. Zhong, J. Luo and A. Borgna, *Applied Clay Science*, 2012, **55**, 18–26.