

## Electronic Supplementary Information (ESI)

The opposite effects of Cu(II) and Fe(III) on the assembly of glucagon amyloid fibrils

Xingfei Zhou,<sup>a\*</sup> Juhua Tan,<sup>a</sup> Lifei Zheng,<sup>b</sup> Saju Pillai,<sup>c</sup> Bin Li,<sup>d</sup> Peng Xu,<sup>a</sup> Bobo Zhang,<sup>a</sup> Yi Zhang<sup>d\*</sup>

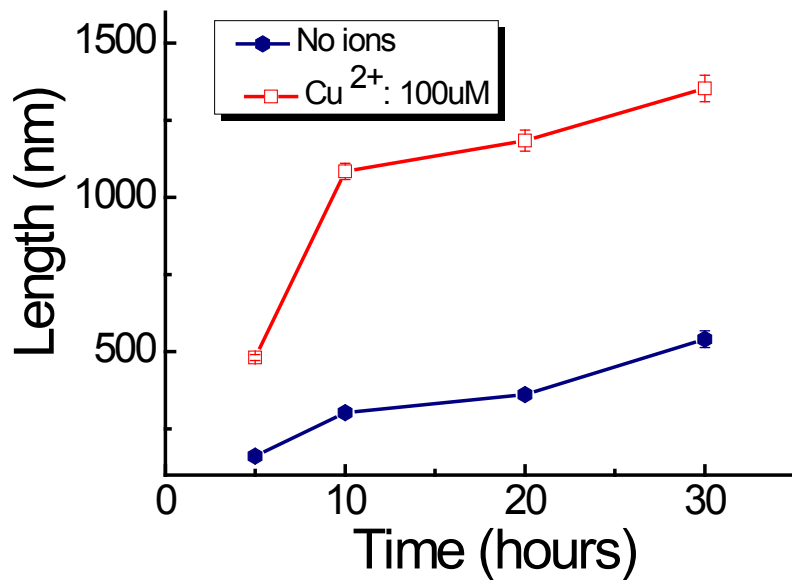
<sup>a</sup> Department of Physics, Ningbo University, Ningbo, 315211, China.

<sup>b</sup> Department of Polymer Chemistry, Zernike Institute for Advanced Materials, University of Groningen, Nijenborgh 4, 9747 AG Groningen, The Netherlands.

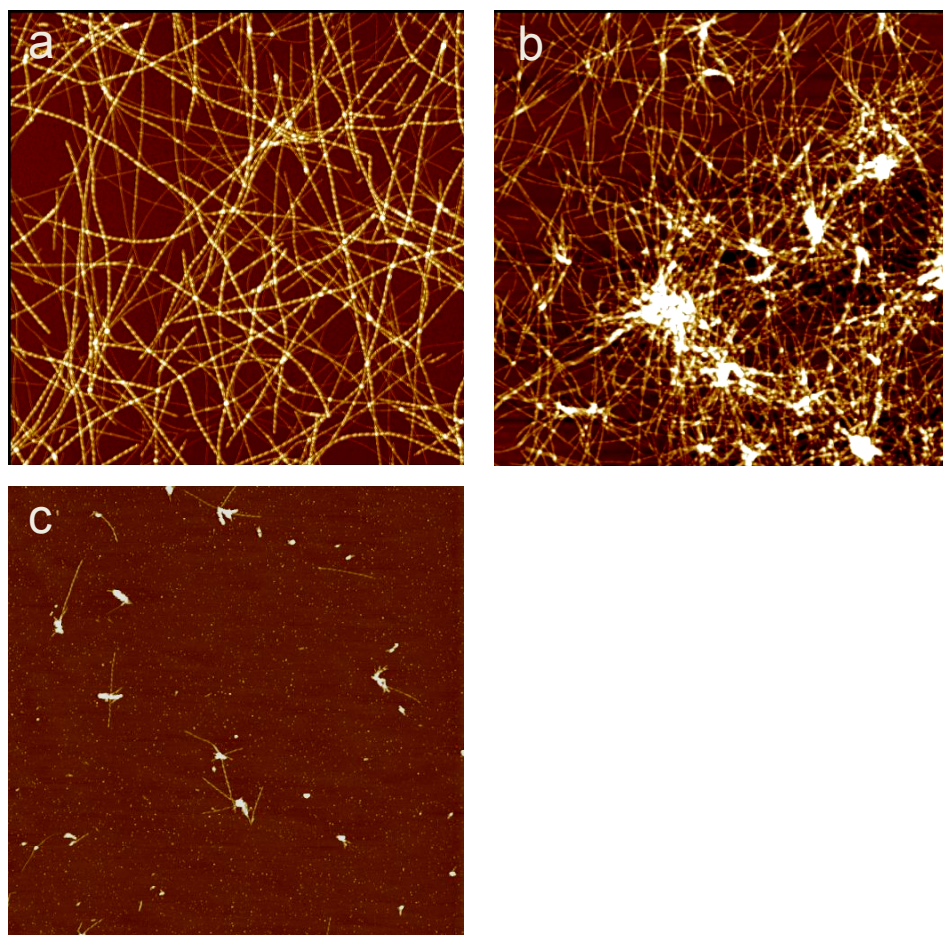
<sup>c</sup> Department of Mechanical and Manufacturing Engineering, Aalborg University, 9220, Aalborg, Denmark

<sup>d</sup> Laboratory of Physical Biology, Shanghai Institute of Applied Physics, Chinese Academy of Sciences, Shanghai, 201800, China.

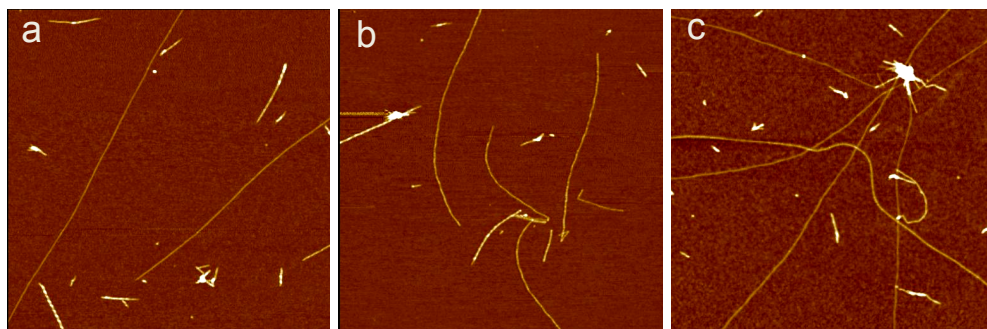
\* Email: zhangyi@sinap.ac.cn; zhouxingfei@nbu.edu.cn;



**Fig. S1.** Average protofibril length of glucagon formed in the absence and presence of 100  $\mu\text{M}$  Cu(II) verse incubation time. Blue curve: No ions; Red curve: Cu(II).



**Fig. S2.** AFM images of the aggregates/fibrils of glucagon formed in the absence and presence of metal ions for three days of incubation. (a): without ions, (b): Cu(II) and (c): Fe(III). Scan size:  $6 \times 6 \mu\text{m}^2$



**Fig. S3.** AFM images of glucagon co-incubated with Fe(II) for 48 hours at three different concentrations. (a-c): 50,100 and 200  $\mu\text{M}$ , respectively. Scan size:  $3\times 3 \mu\text{m}^2$ .