

13TH INTERNATIONAL CONFERENCE ON

ADVANCED MATERIALS AND NANOTECHNOLOGY

OCTOBER 26-28, 2017 OSAKA, JAPAN

Effect of copper-core carbon-shell nanoparticles on the growth of cyanobacterium *Microcystis aeruginosa* and its mechanismChao Li¹, Xiao Zhang¹, Xiong Wang¹, Manli Li¹, Fengying Li¹ and Kun Lian^{1,2}¹Xi'an Jiaotong University, China²Suzhou GuanJie Nano Antibacterial Coating Technology Co., Ltd., China

In recent years, frequent occurrence of cyanobacteria bloom has disrupted the balance of lakes and reservoirs around the world. Copper-Core Carbon-Shell Nanoparticles (CCCSNPs), as a novel material, have showed a good antibacterial and anti-mildew performance in previous study. In this study, we tried to demonstrate the potential effect of CCCSNPs on cyanobacterium *Microcystis aeruginosa* growth and clarify the mechanism to know the application prospects of the material in controlling cyanobacteria bloom. Compared with the widely used algicides CuSO₄, CCCSNPs significantly reduced chlorophyll a content of *M. aeruginosa* when the concentration of Cu²⁺ in the medium was the same as the CuSO₄, so the inhibitory effect of CCCSNPs on algae was better and lasted longer than that of CuSO₄. We further explored the mechanism of inhibitory effect, finding that intracellular excess Reactive Oxygen Species (ROS) were produced after exposure to CCCSNPs, which were 2.4 and 1.5-fold higher than the control and the CuSO₄ treatment, respectively. Excess ROS formation caused oxidative damage to algae and reduced the photosynthetic efficiency, which further inhibited algal growth. Therefore, it is reasonable to propose that CCCSNPs could induce excess ROS production and further interfere with algal photosynthesis to achieve a satisfactory effect with a longer action time.

Biography

Chao Li has obtained his Bachelor's degree in Medicine in China and completed his PhD in Biomedicine from Hull University in 2007 where he was mainly engaged in tumor immunology and nanotechnology used for antitumor drugs research. As a Postdoctoral Fellow, he focused on medical nanomaterials at Centre for Nano-health of Swansea University from 2007 to 2009 and published over 10 research papers in SCI journals.

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