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Toxic Effects of Nano-CuO, Micro-CuO and Cu^{2+} on *Chlorella* sp.

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ABSTRACT

The 96 h acute toxic effects of nano-CuO (N-CuO), micro-CuO (M-CuO) and $^{2+}$ on *Chlorella* sp. were investigated in this paper. The results showed that toxicities decreased in an order of Cu^{2+}>N-CuO>M-CuO. The 96 h EC_{50} of Cu^{2+} on *Chlorella* sp. was 1.06 mg /L, and of N-CuO it was 74.61 mg /L, while no pronounced toxicity was observed when the concentration of M-CuO was lower than 160 mg/L. Further experiments were carried out in order to study the toxicity mechanism of nano-CuO on *Chlorella* sp.. The results of Cu^{2+} release from N-CuO showed less than 0.2 mg/L Cu2+ were released, so the release of Cu^{2+} was not responsible for the toxicity. Further experiments showed N-CuO inhibited formation of Chlorophyll A. Content of Chlorophyll A in the control group was 4.75 mg/10^8 cells, while it declined to 2.89 mg/10^8 cells for 160 mg/L N-CuO after 96 h, which indicated that N-CuO could inhibit photosynthesis of Chlorella sp.. Moreover, N-CuO condensed with algal cells. It affected the activity of SOD and POD, indicating that N-CuO could cause oxidant stress to Chlorella sp.. These may be the toxicity mechanism.

KEYWORDS

Nano-CuO; *Chlorella* sp.; Toxic effects; Photosynthesis; Oxidant stress

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