

# Evaluation of applicability of TiO<sub>2</sub>-embedded expanded polystyrene balls to inhibit the algal growth in mesocosms from rivers and lakes

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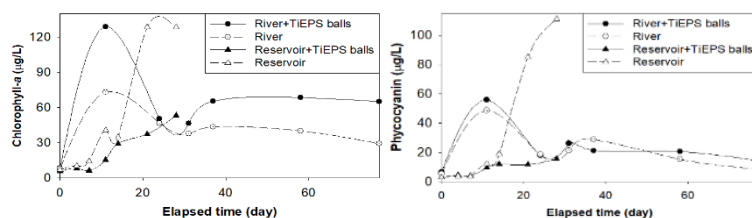
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**1. Introduction** - To inhibit the algal blooms in rivers and lakes, TiO<sub>2</sub>-embedded expanded polystyrene (TiEPS) balls combining nano-sized TiO<sub>2</sub> as a photocatalyst and expanded polystyrene (EPS) balls as a buoyant polymer support were developed, and evaluated as a potential inhibitor of the significant algal growth. Developed TiEPS balls were applied in field mesocosm from river and lake, and inhibition of algal growth and changes in water quality were monitored.

**2. Experimental** – Mobile fences using floating pontoons were installed in rivers (2017) and reservoirs (2018), respectively, to place TiEPS balls with different shading percentages (0, 25, 50, 75, and 100%). On-site water quality monitoring and sampling were conducted 1-4 times for a month. Dissolved oxygen (mg/L, %), pH, temperature, and electrical conductivity were monitored using a multiparameter water quality sensor (YSI Co., USA) while chlorophyll-*a* (Chl-*a*) and phycocyanin were measured using a portal sensor (Modernwater Co., UK).

**3. Results and Discussion** - As a result of applying TiEPS balls with different shading percentages to mesocosms and evaluating the changes in Chl-*a* and phycocyanin over time, there was no significant difference between the experimental group and the control group in the river. However, in the reservoir, Chl-*a* and phycocyanin values were lower in the experimental group with TiEPS balls than in the control group without TiEPS balls. These results indicated that algal growth in the reservoir can be inhibited due to both photocatalytic degradation of algae and shading effect of TiEPS ball to suppress the growth of algae.



**Image 1. Changes in Chl-*a* and Phycocyanin during the field application mesocosm test bed.**

**4. Conclusions** – Newly-developed TiEPS balls were applied in field mesocosm from river and lake, and inhibition of algal growth and changes in water quality were monitored. In the reservoir, Chl-*a* and phycocyanin values were lower in the experimental group with TiEPS balls than in the control group without TiEPS balls. Thus, algal growth in the reservoir can be inhibited due to both photocatalytic degradation of algae and shading effect of TiEPS ball to suppress the growth of algae.

## Acknowledgement

This research was supported by a grant from "Development of algae management using stream structures in the stream"(code RE201901029) funded by ME (Ministry of Environment), Republic of Korea.