

### Hydrogen production with sulfur deprivation in the culture of *Chlamydomonas reinhardtii*

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It is widely known that a technology of hydrogen production using green algae can simultaneously overcome both problems of energy and environment. We performed study of hydrogen production using the green algal *Chlamydomonas reinhardtii* in the sulfur deprivation condition. To produce hydrogen by the green algae is required hydrogenase activation. But hydrogenase having severe O<sub>2</sub> sensitivity are inactivated by photosynthetic O<sub>2</sub> evolution. This problem can overcome to separate between the simultaneous photosynthetic O<sub>2</sub> and H<sub>2</sub> gas evolution (two-stage) by the sulfur deprivation in medium. Two-stage process was performed photosynthetic O<sub>2</sub> evolution and carbon accumulation (stage 1), followed by H<sub>2</sub> evolution consuming endogenous substrate when the green algae are incubated under anaerobic condition(stage 2). After 30 hours of sulfur deprivation, the O<sub>2</sub> evolution rate by photosynthesis fell below the O<sub>2</sub> uptake rate by respiration. In addition, we investigated effect of induction parameters such as cell density, cell growth stage, and light intensity on hydrogen productivity in *C. reinhardtii*.