Degradation of five representative PPCPs by *Chlamydomonas sp.Tai-03*

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Pharmaceuticals and Personal Care Products (PPCPs) are one of the most popular emerging pollutants. PPCPs represent a large range of micro-pollutants, including antibiotics, anti-inflammatory drugs, lipid-lowering drugs, musk and hormones. PPCPs possess the features of high persistence, bioaccumulation and low bioavailability, therefore resulting in the long-term exposure to human, as well as aquatic and terrestrial organisms. Based on the source investigation, most of PPCPs are from domestic wastewater, however, the urban wastewater treatment plant (WWTP) can not guarantee the effective removal of PPCPs. In recent years, several researchers already demonstrated microalgae has good capability of the degradation of organic pollutants. Thus, the present work focused on the degradation of five typical PPCPs (Bisphenol A, Tetracycline, Ciprofloxacin, Sulfadiazine and Sulfamethoxazole) and biofuel production by Chlamydomonas sp.Tai-03. The concentration of those PPCPs for batch tests was set at 1, 5 and 10 ppm, respectively. The result showed that Tai-03 could completely remove Bisphenol A, Tetracycline and Ciprofloxacin at 10 ppm in 145h, 170h and 120h, respectively. The removal percentage of sulfadiazine and sulfamethoxazole was both approximately 50% and 20% regardless with the concentrations used. Furthermore, We also studied the effect of photodegradation, hydrolysis and adsorption on the removal of PPCPs. The photodegradation of bisphenol A, tetracycline, ciprofloxacin, sulfadiazine and sulfamethoxazole were 13.3%, 21.8%, 17.3%, 34.4% and 1.4%, respectively. Hydrolysis rate of tetracycline, ciprofloxacin and sulfadiazine was 48.9%, 9.8% and 2.5%, respectively. The hydrolysis of the other two PPCPs and adsorption capacity was both almost none. According to the analysis of five PPCPs' degradation intermediate products, open-loop reaction occurred in Bisphenol A, Tetracycline and Ciprofloxacin, chain-breaking reaction occurred in sulfadiazine and sulfamethoxazole. These findings indicate micro-algea could be an efficient way to achieve the effective degradation of these five PPCPs.

Speaker Biography

Chuan Chen's research interests focus on novel technologies of biological treatment for refractory industrial waste waters, the integrated technology of simultaneous removal of sulfur, nitrogen and carbon containing pollutants and sulfur reclamation, the environmental behaviour and bio conversion of emerging pollutants (PPCPs) in urban water system, microbial mediated corrosion control in oil field, etc. Chuan Chen participated for more than 10 projects, got 1 second-rank national Award of Science and Technology and 1 first-rank provincial Award of Technology Invention, has published over 50 SCI-indexed papers and 10 patents.

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