Composition of extracellular polymeric substances in stream biofilms colonized for different periods and their interaction with pentachlorophenol

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Introduction and Method

Extracellular polymeric substances (EPS) in stream biofilms play an important role in the sorption of persistent toxic substances (PTS) onto the biofilms [1]. However, the mechanisms of interaction between EPS and organic PTS, such as pentachlorophenol (PCP), are still not clear. In this study, chemical analysis and fluorescence excitation emission matrix (EEM) spectroscopy were employed to determine the composition of EPS in stream biofilms colonized for 15, 30 and 45 days. The binding mechanism of PCP by those EPS was also analyzed using UV–vis absorption and EEM fluorescence spectroscopy [2].

Results and Discussion

The contents of polysaccharides, proteins and total organic carbon (TOC), and the three-dimensional fluorescence spectra of the three EPS showed different characteristics (Figure 1). The fluorescence titration data indicated the quenching process for all peaks was static quenching process. Both UV-vis absorption and EEM fluorescence spectroscopy demonstrated that binding of PCP to EPS did occurre and the binding was driven by hydrogen bond and van der Waals force. The study revealed the effect of culture time on property of the biofilm EPS and confirmed the important role of EPS in PTS sorption.

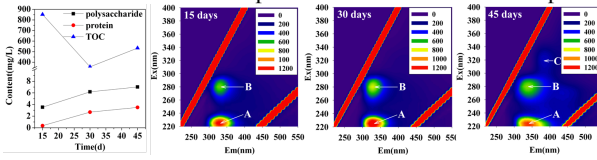

Figure 1: Composition and fluorescence spectroscopy of EPS at different culture time. Peak A: aromatic proteins; peak B: soluble microbial by-product-like substances; peak C: humic acid-like substances.

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[1] Zhang *et al.* (2010) *J Hazard Mater.* **175**, 359-365. [2] Ross *et al.* (1981) *Biochemistry* **20**, 3096-3102.