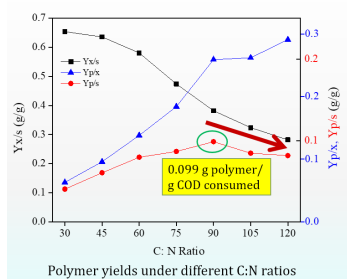


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Study of synthesis of biodegradable plastics from Alkaline fermented excessive activated sludgeYao-Hui Liu¹, Xiu-Lan Song², Chi-Wai Kan³ and Hong Chua¹¹Technological and Higher Education Institute of Hong Kong, Hong Kong²Taiyuan University of Technology, China³The Hong Kong Polytechnic University, Hong Kong

The environmental problems associated with plastics have become increasingly severe in recent years. Technologically and economically feasible solutions are in urgent need in order to ensure sustainable development in the plastic industry. Polyhydroxyalkanoates (PHAs) are a family of specialized polyesters of hydroxyalkanoates (HAs) and can be completely degraded in natural environment. They can be synthesized naturally or under artificially controlled processes. The barrier of limiting the application of PHAs is the high production cost. From years of study, PHAs are proved to be able to be accumulated within the bacterial cells in activated sludge and the production yield had been greatly improved under the optimized Carbon to Nitrogen (C:N) Ratio and Carbon to Phosphorus (C:P) ratio. Therefore, PHAs synthesis is able to combine with wastewater treatment. However, high carbon source is still required for a higher production yield to offer substrate pressure for PHAs accumulation. On other hand, wastewater treatment plants produce large amount of excessive activated sludge (EAS) to send to landfill sites. This study aims to investigate the PHAs synthesis of PHAs from the fermented EAS via ferrous activated persulfate oxidation method and analyze the composition of the PHAs under various fermented sludge and wastewater. EAS samples were digested with combination of potassium monopersulfate, potassium bisulfate and potassium sulfate and ferrous sulfate to obtain the optimal concentration based on the digestion of EPS and intracellular substances. The optimized digested sludge was served as carbon source together with raw sewage for PHAs production. The ratio of Hydroxybutyrate (HB) to Hydroxybutyrate (HV) was investigated to reveal the relation with the digested sludge dosage. The outcomes of this study provide fruitful solutions to reduce the production cost of PHAs and maximize the reuse of EAS in wastewater treatment process.

**Recent Publications**

1. Tsang, Y.F., Lu, X.Y., Liu, Y.H., Zhong, D., Sin, S.N., Lo, W.H., Chua, H. (2017) Filamentous foaming control in a sequencing batch reactor (SBR) treating high strength organic wastewater. *Desalination and Water Treatment* (accepted).
2. Dan He, Yiu Fai Tsang, Xiaoying Lu, Yaohui Liu, Hong Chua, (2014) Production of Polyhydroxyalkanoates (PHA) from Treated Industrial Effluent and Their Characteristics, *Water Science and Technology*.

3. He, D., Tsang, Y.F., Lu, X.Y., Liu, Y., Chua, H. (2015, June). Production of Polyhydroxyalkanoates (PHA) from Treated Industrial Effluent and Their Characteristics. The 12th IWA Leading Edge Conference on Water and Wastewater Technologies, Hong Kong.
4. Y.H., LIU, W.H.O., WAI, H. CHUA, (2017) Reuse of Activated Sludge as Water Retention Substrate for Combating Desertification 5th World Convention on Recycling and Waste Management, Singapore.
5. Yao-Hui LIU*, Xiu-Lan SONG, Hong CHUA, (2018), Synthesis of PHAs using Carbon Source from Ferrous Activated Persulfate Oxidation combined with Alkaline Fermentation of Excessive Activated Sludge, The 3rd International Conference on Biological Waste as Resource 2018 (BWR2018), Hong Kong.

Biography

Yao-Hui Liu has completed his PhD from The Hong Kong Polytechnic University. He is serving as an Assistant Professor at the Technological and Higher Education Institute of Hong Kong (THEI). He holds over 30 publications in international journals and has been taking cares of over six government and institution funded research projects in Hong Kong with the overall funding scheme reaching 5M HK\$. He also severs as a Manager for educational sector for the Waste and Resource Centre in the institute. He is Member in International Association for Hydro-Environment Engineering and Research Hong Kong Chapter (IAHR-HK).

yhliu@vtc.edu.hk

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