A bacterial cell array chip for the analysis of degradation byproducts toxicity of an endocrine disrupting chemical, DEHP [Di-(2-EthylHexyl)-Phthalate]

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In this study, we present the application of the bacterial cell array chips for toxicity monitoring of degradation byproducts and evaluation of biodegradation processes. Biodegradation processes based on an anaerobic microbial culture system was adopted for biotransformation of di-(2-ethylhexyl)-phthalate (DEHP), a well known endocrine disrupting chemical and their process efficiencies were estimated and compared by using toxicity measurement of degradation byproducts conducted by bacterial cell array chips. The bacterial cell array chip is composed of numerous stress- or chemical-specific recombinant bioluminescent bacteria. Recombinant bioluminescent bacteria have different chemical- or stress-specific promoters fused with bacterial lux genes, thus enabled toxicity analysis through their specific bioluminescent response. It was found from pre-screening tests that the DEHP caused DNA damage, membrane, protein and oxidative damage to E. coli. Toxicity based result was well correlated to the toxic intermediates found after GC/MS analysis of 10 and 20-day old DEHP culture-extracts.