

# Genome-Writing using Big Data and Artificial Intelligence for Mass Production of Plastic-Decomposing Bacterium

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## Abstract:

Plastic wastes in the ocean cause serious environmental problems all over the world; plastics swollen by animals cannot be properly digested and kill them. What makes it worse is that they are rarely decomposable in nature and therefore, accumulate in the environment. In order to overcome this problem, several researchers have paid attention to a plastic-decomposing bacterium. This bacterium consumes plastics to gain energy and therefore, if used properly, we can design efficient recycling process with the bacterium. However, the bacterium is still not optimized and there are still rooms for the improvement of its activity.

Herein, we propose the solution for this problem with pair of cutting-edge technologies, namely, genome-writing and artificial intelligence. Although genome-writing has great potential to control bacterial activity without limitation, enormous work is necessary to find ideal bacterium. At this point, artificial intelligence (AI) combined with automated experimental facilities can play an important role. If multiple sets of DNA sequences of plastic-decomposing bacteria was fed to AI, it can automatically extract similar features among them. This result can be used to modified DNA sequences and test their plastic-decomposing ability. By repeating this process using automated the experimental facilities, optimized plastic-decomposing bacterium can be obtained. In our best situation, this bacterium will be “synthesized”, not cultivated, by chemical reactions and produced in industrial scale. If this research plan is properly completed, ordinal plastics can be regarded as “bio-degradable” and no longer harmful to the environment on our planet.